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COMPUTERWORLD

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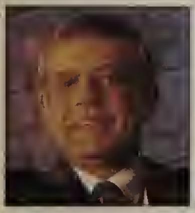

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Can Wall Street absorb Drexel Burnham's hundreds of IS workers? Eventually, but probably at lower salaries, according to recruiting firms. Page 4.

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Microsoft eases licensing rules; License Pak smooths user copying. Page 14.

Free the Baby Bells! Congressional battle to remove constraints of the AT&T divestiture settlement has begun. Page 113.

M&D's Dodge bails out as merger with MSA proceeds. Page 8.

NEWSPAPER

IBM Unix thrust carries promise, risk

BY PATRICIA KEEFE
CW STAFF

NEW YORK — IBM charged full force into the Unix market last week, launching a power-crunching family of nine RISC- and Micro Channel Architecture-based workstations and servers capable of processing up to five instructions per machine cycle. Most computers process only one instruction per cycle.

At best, IBM's muscular entry is expected to strengthen its precarious foothold in the scientific and technical arenas. "It's a spectacular machine. It's going to fundamentally change the way we do our science," said John Miller, an associate professor at the University of California at Berkeley and a user of networked IBM RT workstations.

At worst, the ambitious foray will carve out market share at the expense of IBM's higher-margin proprietary systems. "We don't want to buy any more mainframes, and with the new models, it looks like we won't have to," said David Allen, information systems manager at the Sunnyvale, Calif., division of Martin Marietta Corp. "We've now got a boatload of PCs doing 3270 emulation, and we'd like to use the new models to work as servers to tie them together."

"IBM could win the MIPS war and lose their shirts," warned Nili Young, a midrange analyst at Meta Group, Inc. who left IBM's RISC System/6000 launch team in October.

But for now, the RS/6000

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Ed Kashi

IBM's *workstation line caught the attention of users, competitors*

Power curve

- Competitive fallout.
- Software surge.

See stories, pages 139-141.

Insurer's cost-cutting policy: Out with hosts, in with LANs

BY ELISABETH HORWITT
CW STAFF

WILMINGTON, Del. — Consolidated Insurance Group, Inc. uses a simple ploy to dramatize the difference between its former mainframe operations and its current local-area network-based environment.

Visitors are initially taken to the beautiful, glass-walled room housing the almost-defunct IBM 3090 Model 120E mainframe, along with "monster disk drives, like big refrigerators," said Wayne Read, the firm's assistant vice-president of information systems.

"Then we show them the small office with our seven LANs, plus three or four shelves, and disk drives the size of PCs. It's pretty powerful," Read said.

Consolidated hopes to have all of its applications on seven Novell, Inc. LANs and to shut down its 3090 by the end of next month, a move that should mean millions of dollars in savings and one that has already caused a massive IS department exodus.

Continued on page 12

Proprietary lines blur

DEC finds Unix market has life of its own

BY MARYFRAN JOHNSON
CW STAFF

One year after its own bruising entry into the crowded, hotly contested Unix workstation market, Digital Equipment Corp. could probably teach IBM a few survival tricks.

Yet even if DEC were so inclined, the No. 2 computer company is too busy coping with the challenges of competing product lines, an overwhelmed sales force, some disappointed users and unexpected interest in Unix from commercial customers.

The reduced instruction set computing market has been a rough-and-tumble place for Maynard, Mass.-based DEC, which rolled out a suite of workstations and multiuser systems last year that are based on the RISC chip from Mips Computer Systems, Inc. The machines run Ultrix, which is the DEC version of AT&T's Unix operating system.

Analysts have tagged DEC's initial RISC systems as mediocre, plagued with bugs and lacking a broad-enough range of

Continued on page 139

'Copyright' in Russian: Right to copy

BY WILLIAM BRANDEL
SPECIAL TO CW

In a Soviet society wrestling with free-market dynamics for the first time, *glasnost* is sometimes spelled "Copy *.*".

Duplicating copyrighted software is considered resourceful, not sleazy, in the Soviet Union, according to Soviet observers and vendors trying to sell into the emerging Eastern Bloc market. Although no precise data is available, many vendors and observers agreed that hundreds of millions of dollars worth of illegally copied U.S. software is in use in the Soviet Union and that at least half of all Soviet personal computers run some pirated software.

David Flaherty

Software piracy "is so common that many [Soviet] organizations don't even consider it criminal," said Seymour Goodman, an adviser to the U.S. Department of Defense and director of MIS and policy at the University of Arizona in Tucson.

In the Soviet Union, where intellectual property carries little financial benefit, the legal structure is not ready for a burgeoning software industry. "Our problem is that present Soviet copyright law does not include software and is not doing the trick," said David Curtis, a corporate attorney at Microsoft Corp.

"The most popular software in the government is a Soviet version of DOS," said Ilena Cavelyava, a consultant to Microsoft's Soviet distributor, Management Partnership, Inc., and a professor of foreign trade relations and intellectual property rights at Moscow State University.

Illegal copying is so widespread because Soviet information systems officials simply do not have any concept of intellectual property, Cavelyava said.

"Soviet officials take great umbrage to the charge that they are pirating software," said William McHenry, a Georgetown University professor of business administration.

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Quotable

> *"It is so common that many [Soviet] organizations don't even consider it criminal."*
>
> SEYMOUR GOODMAN
> U.S. DEPARTMENT
> OF DEFENSE
>
> *On the prevalence of Soviet software piracy. See story page 1.*

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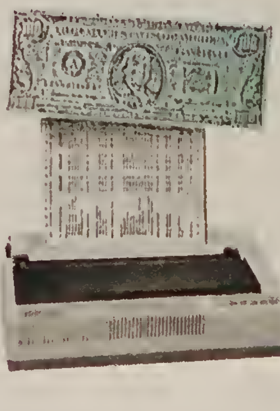
UPDATE

Just the Fax. A recent study of 200 IS managers by Techvantage reveals that the technologies in greatest demand in the near future will be those that further the distributed processing cause. Specifically, IS likes network management tools, RDBMSs, LANs and facsimiles. But OS/2, PS/2 and 486 machines hold little interest. The report says IS has gotten smart about separating true needs from bells and whistles because they operate in a real world of limited budgets and growing demands. All this aside, IBM's got this hot new 30-MIPS workstation, and have you seen what's new in the world of multimedia?



Suit the printer to your data center — or learn to live with a monster. Page 89.

Rich Frishman

The Seattle Symphony found an SQL answer to its ticket-selling and fund-raising goals. Page 57.

EXECUTIVE BRIEFING

■ **IBM's bold new Unix-based workstation line debuted,** with users and analysts dazzled by the hardware technology but concerned about the software needed to take advantage of it. It's critical that IBM deliver on a promise of 1,500 applications by year's end. Workstation leaders Sun and Hewlett-Packard said the IBM line legitimizes the Unix market, but they could be girding for a price war that will erode margins everywhere. The workstation war can only get bloodier for DEC, which has had a rough year in the Ultrix trenches. **See stories, pages 1, 139, 140 and 141.**

■ **Drexel Burnham's 520 information systems employees** will probably be job-searching after the junk-bond pioneer's Chapter 11 filing. The flood of resumes may result in lower salary offers, recruiters say. Drexel will retain a temporary IS liquidation team to shut down operations and sell Drexel's custom brokerage applications at salvage prices. **See stories, page 4.**

■ **Scrapping its 3090 for local-area networks,** Consolidated Insurance Group in Wilmington, Del., is finding the downsizing road cheaper, faster and better. The firm expects to save $1 million per year by migrating to seven Novell LANs, and users are "ecstatic." **Page 1.**

■ **Users of Data General hardware** see a new spirit of customer service at the beleaguered vendor, thanks to recent management changes and the Aviion workstation line. However, some customers are still leaving the fold, saying that support is not up to snuff despite the company's strong core of technology. **Page 6.**

■ **The concept of copyrighting software** is one tenet of capitalism that has not caught on within Soviet *glasnost.* As a result, piracy of U.S. software is rampant in the Soviet Union, and U.S. vendors are puzzled over what can — or should — be done about it. **Page 1.**

■ **IBM began making 16M-bit** memory chips on existing production lines, easing concerns that the large DRAMs would need new fabrication technologies. It also shipped the first IBM-made 386 microprocessors, the result of a technology-exchange pact with Intel. **Page 10.**

■ **Can Maslow's hierarchy** of human needs serve as a model for the evolution of the IS function? Mutual Benefit Life's Charles McCaig thinks so. **Page 63.**

■ **Some AT&T Tariff 12 customers** are finding that implementation delays caused by the FCC complaint process are irksome and costly. Complainants MCI and Sprint may be perpetrating a shooting match that will ultimately hurt the customer. **Page 57.**

■ **Storage Technology revolutionized** data center operations with its robotic tape management system, but it is about to get some competition from Memorex Telex. **Page 33.**

■ **Research into fuzzy logic** is commanding a lot more attention — and funding — in Japan than in the U.S. The fuzzy logic concept has practical applications in systems ranging from train controls to cameras, but it has failed to excite very much interest in U.S. government or commercial research. **Page 114.**

■ **On-site this week:** A mountain of paperwork is the target at Raytheon's Missile Systems Division, where a high-tech arsenal of imaging, electronic data interchange (EDI) and a new procurement application takes aim. The defense contractor in Andover, Mass., is a beta-test site for Arthur Andersen's Procurement D, an IBM mainframe-based manufacturing resource planning system to streamline the procurement process. Raytheon is also using Wang's imaging technology and testing out its own mainframe-based EDI system on PCs. **Page 37.**

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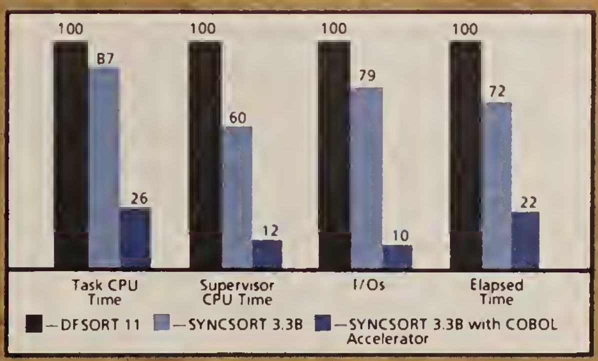

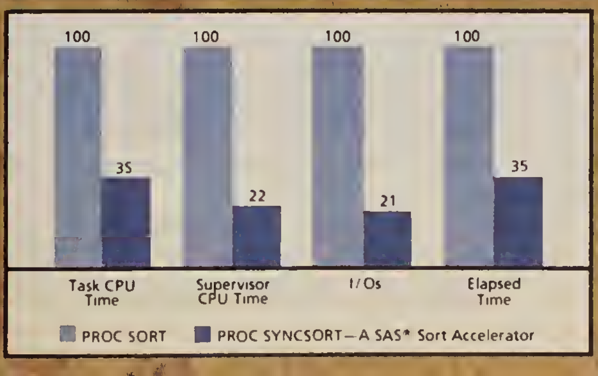

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Drexel layoffs hit the Street

A glut of IS personnel at bargain prices could flood the financial market

BY ROBERT MORAN
CW STAFF

Drexel Burnham Lambert, Inc.'s Chapter 11 filing is expected to literally dump most of its 520 information systems employees out on the street. Executive recruiters last week indicated Wall Street firms can absorb that many unemployed professionals — but not quickly or easily.

The once high-flying financial firm sought protection from creditors as its once-mighty junk-bond dominance continued to undercut its financial health. The company indicated it would liquidate much of its assets and was expected to dismiss most of its 5,000 employees Friday.

"We are all stunned by this," said Howard Ertel, senior vice-president of systems and a veteran of 31 years at Drexel. "We hadn't expected anything like this to happen."

Executive recruiters specializing in placing IS professionals said that employees await a mixed reception on Wall Street.

"There is definitely a market for these people, but they may flood the market, which may cause them to be hired at lower salaries," said Peter Fiorillo, president of Robert Half of New York, an executive recruitment firm.

"These people are seriously going to have to change their viewpoint of what they are worth dollarwise," said one recruiter, who asked that his name and firm not be identified. "There is a specialty curve, and the key is that the only people who are going to use them are other brokerage firms."

Jerry Higgins, who described himself as the former senior vice-president of data processing, communications and technical services at the firm, said that he will stay on as part of a 180-member liquidation team.

"We don't know how long it will take to shut down," he said. "There is a lot of experience with mergers and acquisitions, but not with shutdowns."

Ertel said the team will guide Drexel to an orderly shutdown — reporting to appropriate regulatory agencies, preparing end-of-the-month reports for clients and safeguarding records.

However, at most the process will safeguard the positions of 180 employees for a few months, leaving 340 applications development, technical service, computer operations, communications, secretarial and administrative employees searching for positions.

The recruiter who asked not to be named said that knowledge of applications and of the business itself has boosted salaries for developers on Wall Street. However, he added, "people without tremendous skills will have an easier time getting jobs at closer to what they are earning than some of the specialists."

Higgins confirmed that Drexel employs between 200 and 220 developers. Ertel said he was "very optimistic that most of the folks will find jobs in the metropolitan area at comparable salary levels."

As part of the orderly shutdown, management is charged with finding buyers for what Ertel said was million of dollars worth of software tailored to the brokerage industry.

However, Higgins said that management is also using the software sale as an avenue to sell its employees. Higgins, who did not disguise his intentions, said the firm was selling the software at salvage prices and that, given the situation, they could provide early bidders with the "team of people who had developed the systems."

Skills for sale

In lieu of an outplacement service, management and information services employees at Drexel Burnham Lambert, Inc. are using the technology that once powered the company to find themselves jobs.

"We are putting together a sort of a job fair for employees and doing everything possible within the division to assist employees by preparing catalogs of their skills and trying to work with outside organizations to match the resources that we have here to the requirements that other firms have," said Howard Ertel, senior vice-president of systems.

The employees themselves are using local-area networks to produce resumes in great numbers, and facsimiles and telephones to identify potential jobs. Pat Power, assistant vice-president of office systems consulting, said, "There is an enormous amount of interaction and networking among people here" to find opportunities and projects outside Drexel.

Power said that although employees are optimistic, he has decided to become a consultant: "I've been in the corporate world for almost 11 years and I'm tired of it. This is the second company to fold under me, and considering how volatile this industry is, I don't see consulting as being any less secure."

Concurrent product has Unix market in sight

BY MARYFRAN JOHNSON
CW STAFF

WESTFORD, Mass. — Concurrent Computer Corp. paved a new path last week for its 30,000 customers with a new line of real-time Unix multiprocessors aimed at the technical and transaction processing market.

As the first product line to come out of the 1988 merger of Massachusetts Computer Corp. (Masscomp) and Tinton Falls, N.J.-based Concurrent, the Series 8000 is based on the reduced instruction set computing (RISC) R3000 chip from Mips Computer Systems, Inc.

"Concurrent is showing its customers, 'Yes, we're committed to standards, and yes, we're moving the way the rest of the world is moving,' " said Alea Fairchild, a technical market analyst at Dataquest, Inc.

The new systems, in three models that start shipping in April and June, range in power from 20 million instructions per second (MIPS) to 160 MIPS and cost from $55,900 to $96,000. They will also support industry-standard VME buses, X Window System, OSF/Motif graphical user interface, Ethernet and Network File System.

Real-time ratings

Concurrent looks to bolster its competitive position

	Concurrent 8300	Harris NH4000	DEC 5810	MIPS M2000	HP DN10000
Clock rate	25 MHz	25 MHz	25 MHz	25 MHz	25 MHz
MIPS	20-40	20	19	20	20
Number of CPUs	1-2	1	1	1	1-4
Memory range	8-64M bytes	4-144M bytes	32-256M bytes	16-128M bytes	8-128M bytes
Entry-level price	$56,000	$69,000	$75,000	$70,000	$65,000

CW Chart: Doreen Dahle

Concurrent also announced a new version of its RTU operating system, a real-time-enhanced flavor of AT&T's Unix System V, which will be available at the end of the year.

The 8000 series creates a new midrange offering for Concurrent, which now has the 5000/6000 series of low-end Unix machines from Masscomp and its own proprietary real-time system, the Micro 3200 line.

"Part of the rationale for the merger was the 3200 base was migrating toward standards, which is a slow process for real-time applications," said Jennifer Johnson, manager of Concurrent's third-party marketing group. "That installed base of 3200 users is where our future is."

Concurrent's inability to run anything other than its own software on the 3200s has become a sore point for some customers.

"Our major complaint with Concurrent is it's such an oddball company," said Dean Yoesting, director of the computer center at the U.S. Department of the Interior's regional office in Anchorage, Alaska.

"Everything on it is proprietary, so their database, their operating system, won't run on anybody else's machines. We need to run a geographic information system, and there's no third-party software out there that will help us," he explained.

The need to run GIS software drove the spatial analysis team at the U.S. Environmental Protection Agency in Las Vegas away from Concurrent and to Sun Microsystems, Inc. Sparcstations.

"Our Concurrent machine has basically fallen into disuse," said systems manager Roy Mogren. "It just kind of holds the coffee cups now."

Henk Schalke, vice-president of Concurrent's newly formed small systems division, said real-time users of systems from Digital Equipment Corp., Harris Computer Corp. and Encore/Gould Computers would be able to migrate to the new Unix systems by using Concurrent's networking tools.

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Picking up the bytes and pieces after a wind storm

BY ROSEMARY HAMILTON
CW STAFF

When high winds and tornado conditions swept through Atlanta earlier this month, a computer services subsidiary of First Financial Management Corp. found itself in the wrong place at the wrong time.

While other data centers escaped damage from the Feb. 10 storm, Basis Information Technologies, Inc. suffered at least $5 million in losses, according to Bill Kenney, a Basis executive vice-president.

However, Basis went from waterlogged and useless mainframes and storage units to a fully operational data center in two days, Kenney said in an interview last week. He credited a disaster recovery team of nearly 200 people and its primary vendor, Unisys Corp., for making that happen.

The disaster recovery team, which included Basis employees and outside contractors, handled the extensive cleanup and repairs and brought back all the systems. Unisys, however, pulled off the most important job, Kenney said.

Basis has its own backup facility, located one mile away from the main data center. But when the time came to use it, the company faced a cold, hard fact: It did not have all the necessary equipment to sustain a production environment. Since Basis provides computer services to 1,300 financial services clients, many of whom require 24-hour-a-day support, Basis had to come up with another plan quickly.

The firm turned to Unisys and asked it to pull off the difficult task of finding two replacement mainframes and several disk drives by Monday. Unisys did it, and Basis had all the necessary equipment up and running at the beginning of last week.

"They don't guarantee replacements; it's more a best-effort deal," Kenney said.

At the end of last week, Basis executives were also determining the other damages with insurance companies and auditors. The initial estimate for computer equipment alone topped $5 million, Kenney said. He added it was unclear whether the damaged mainframes can be used again since he does not know exactly what the water did to the systems' components.

Other Atlanta data centers were far luckier than Basis. Some reported minor power problems, while others completely escaped the damaging winds and rain (see story at right).

However, at 6 a.m. Saturday, Feb. 10, an angry gust of wind leveled a large tree across the street from the Basis data center, which brought down the power lines. Then it whipped across the data center roof, tearing open a 50-foot gash, knocking out air-conditioning units and demolishing the drainage system, according to Kenney.

When the roof opened on the building, the rain poured down on the two Unisys V530 mainframes and their associated disk drives as well as several tape drive units. Kenney estimated that an inch of water was in the data center within 45 minutes.

Within the hour, Kenney and other executives from Basis and its parent company, First Financial Management, were assembled at the data center. Ironically, Basis executives had a meeting the prior day to review disaster recovery procedures.

The disaster recovery team feared power would be restored and cause electrical shocks or worse, so all power to the data center was cut off and generator-powered lights were turned on. Plastic coverings were used to patch the roof and cover the mainframes and other hardware to prevent more water damage. Tape cartridges were removed from the data center and placed in a second building to begin drying out.

At the same time, local Unisys representatives were contacted and told Basis it had to install replacement units. One V530 mainframe and several disk drives were located at a Unisys plant in Chicago. Another mainframe was found in California. They were loaded onto trucks and on the road by late Saturday.

On Sunday, the undamaged processors were brought back on-line. These included Stratus Computer, Inc. processors, which handle automatic teller operations, that were located at the opposite side of the room from the torn roof and received no water damage. Another group went to work on the damaged tapes. "We copied the wet tapes to dry tapes, and it does work," Kenney said.

Some of the Unisys hardware arrived on Sunday, and Unisys and Basis workers assembled it.

In phases, the team restored operations. The last piece of Unisys hardware arrived at 5:30 a.m. Monday morning. Throughout that day, service was returned to customers. By 8 a.m. Monday, most customers were up and running. By 9:30 a.m., all clients were on-line, Kenney said: "In my opinion, it was just short of miraculous."

Roll of the dice

Basis Information Technologies learned the hard way that when one's number is up, there is not much one can do about it.

While it was smack in the path of the recent Atlanta storm, other data centers got off easy. Turner Broadcasting Systems, Inc., for example, rode through the storm as if it did not happen.

"As far as I know, we weren't touched," said Jeff Haney, computer operations manager. "This building has a generator and a UPS. If we have power flickers, we can go unaware."

So did Norrell Corp., according to Chief Information Officer Dennis Hill. "Not a thing happened," Hill said. "We never even went over to emergency power that time. It had a very sporadic kind of effect. We just got lucky."

Of the 25 Atlanta-based customers of Comdisco Disaster Recovery Services, Inc., only two put the company on alert, according to Vic Fricas, senior vice-president of operations at Comdisco. The alert status gets Comdisco ready to respond, but the two customers then followed up to say no action would be necessary, Fricas added.

A spokeswoman for Sungard Recovery Services, another major disaster recovery company, said no problems were reported from the company's Atlanta-area clients.

ROSEMARY HAMILTON

Support lifts DG customers' sagging hopes

BY NELL MARGOLIS
CW STAFF

MARLBORO, Mass. — If faltering giant Data General Corp. manages to escape being written off as a minicomputer-making dinosaur, it will likely be thanks to having mastered the oldest cliche in the commercial world: Keep the customer satisfied.

"A lot of people used to have doubts about [DG's] long-term viability. And, frankly, I used to share those feelings," said Don Clark, vice-president of the North American Data General user group. However, he continued, "over the past 1½ years, there have been changes that have certainly buoyed *my* spirits."

Clark cited last year's launch of the Aviion line — DG's entry in the hotly contended reduced instruction set computing workstation arena and the computer family on which it is staking its long-term hopes — and an executive realignment. Perhaps most important, however, was "the huge difference in treatment of users," Clark said.

Many among DG's installed base of MV users told *Computerworld* that they shared Clark's optimism. "They're trying very hard to be responsive," said Frank Perry, chief of data operations at the Rhode Island Department of Transportation, a major MV user site since 1979.

According to Ken Olsen, a data communications group manager at 3M Co., tightened service and support and heightened awareness of user concerns in general are among the reasons his group not only will remain in the DG fold as MV users but plans to make Aviion a mainstay of its move into Unix.

The feeling is not universal, however. At Home Mutual Life Insurance Co. in Baltimore, for instance, Information Systems Director Howard Brenner reported that after five years as an MV user, his approximately $10 million company plans to have DG phased out entirely and replaced with personal computer local-area networks by the end of this year.

"Believe me," Brenner said, "I have nothing against DG as far as their technology goes. Their hardware is fine." Service and support, he said, are another story.

Home Mutual has also been disconcerted by its supplier's disappointing financial performance. "We saw them falling farther and farther behind the marketplace," Brenner said.

An IS manager at a defense contractor that uses MV systems asked for anonymity but said, "We're basically happy with Data General's technology but pretty disgusted with the company. Follow-up and support from their sales operation is not what we would hope to see."

Last year, therefore, the defense contractor opted out of DG service. "We're on self-maintenance now," the manager said. "We still have DG's equipment — but that's all."

Greg Farman, president of Turnkey Publishing, Inc., an Austin, Texas-based company, which is a longtime DG user and publisher of the DG user group's monthly magazine, said that he remembers well when such stories typified user reaction to DG. However, he said, that was then; this is now.

In the interim, co-founder and reigning technology guru Edson de Castro passed on the chief executive officer mantle to the more marketing-oriented, people-skilled Ronald Skates.

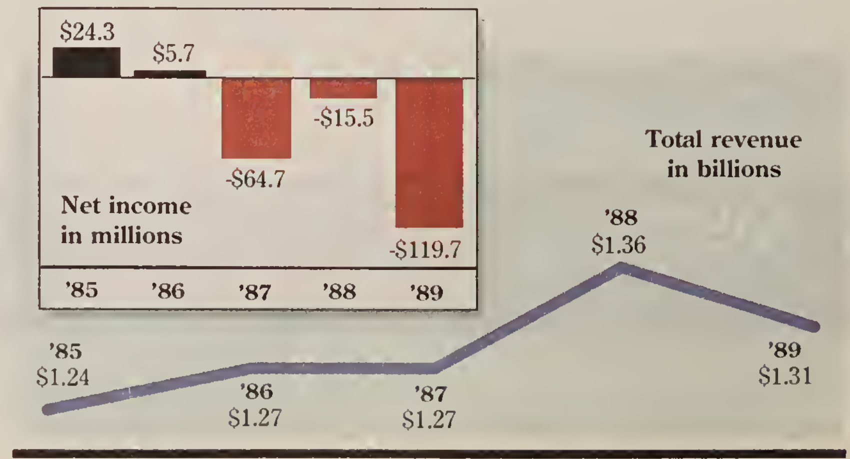
DG's new direction, Farman said, is exemplified by the advent of accessible and user-directed executives such as Skates and Unisys Corp. veteran Stephen Baxter, brought in as vice-president of marketing last April. "Steve Baxter is the guy everyone is looking up to right now to heal the friction between users and DG — and it definitely was there," Farman said.

Even among the faithful, concern over DG's sagging numbers persists. The numbers, Skates said at last month's annual meeting, are unlikely to alter appreciably before 1991.

"They're caught up in a slump that's affecting the whole industry, so we don't fault them in particular," Olsen said. "But they've had to reduce the work force several times, and we have to wonder when these reductions will start to show up in R&D or in support? Sooner or later, they're going to have to make cuts in all aspects of the business to keep trimming down."

Tracking progress

Data General's spotty fiscal performance is a major concern for customers



Source: Data General Corp.

CW Chart: Doreen Dahle

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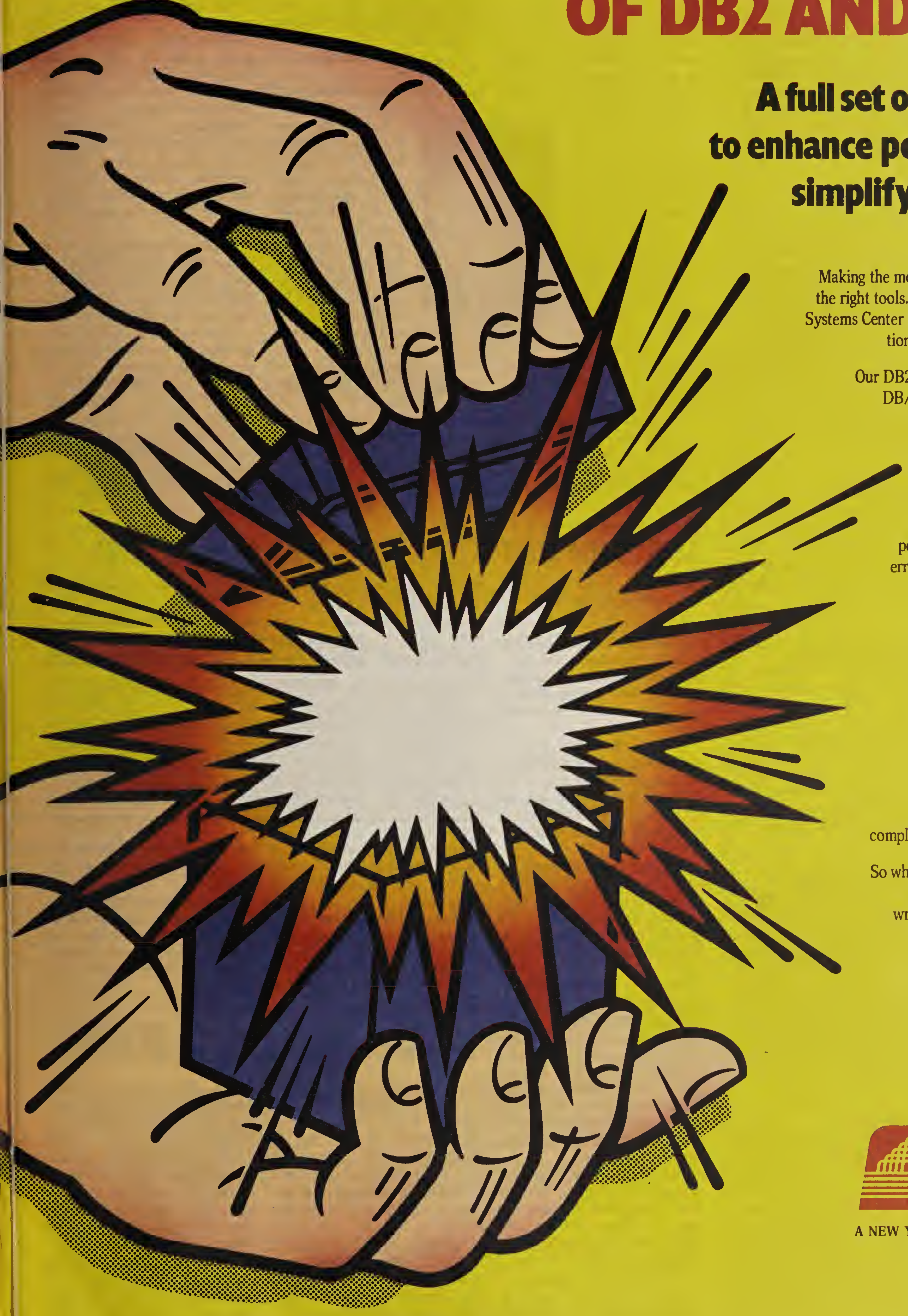

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NEWS SHORTS

PS/2 on the QT

IBM gave demonstrations of an unannounced piece of its developing Personal System/2 server technology at Networld '90 in Boston last week. The server, which linked 16 PS/2 Model 70s over an Ethernet network, was based on a 25-MHz Intel Corp. 80386 chip. The box also incorporated an Intel I486 processor card developed by Aox, Inc., 24K bytes of memory cache, two Token-Ring bus master cards and 14 320M-byte hard disk drives. The unit was running OS/2 Extended Edition 1.2. IBM would not say when it would be formally introduced.

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AT&T passes muster on outage

Telecommunications managers at large companies were satisfied with how AT&T responded to its network outage last month, and nearly 90% said they had no plans to switch to a different primary carrier, according to a survey released last week. But Business Research Group in Newton, Mass., which conducted the survey, noted that 118 of the 193 Fortune 500 companies polled said they had been unaffected by the nine-hour outage, primarily because they were closed that day for the Martin Luther King Day holiday. Meanwhile, AT&T stumbled again when a portion of its toll-free 800 service became inoperable for 90 minutes on Feb. 9. The company said a technician failed to update a routing table from one control point to another, leaving a handful of 800 lines out of service, including the Internal Revenue Service's information line.

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Good news, bad news for HP

Hewlett-Packard Co. reported a 17% increase in net revenue but a 2% decline in earnings for its first quarter ending Jan. 31 in comparison with the corresponding period for 1989. The company cited the "increased cost of sales" and shifts in its product and sales mix for the earnings decline. Revenue totaled $3.1 billion while earnings amounted to $173 million.

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Cray bumps ETA at Florida State

Next month, Florida State University will replace a supercomputer from ETA Systems, Inc., the now-defunct subsidiary of Control Data Corp., with a Cray Research, Inc. system. Interestingly, CDC is the front-runner on the deal because of its marketing arrangement with Cray. John Nall, deputy for the office of computer and information resources at the university, said his department negotiated a return of the ETA system and a reduced price of some $6 million on the Cray in exchange. He also said he had no problems with the ETA system but felt scientists would prefer the Cray because it is more widely used.

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Mix-and-match multiprocessing

Chips and Technologies, Inc. has announced a multiprocessor system architecture that allows disparate microprocessor and bus designs to run on a single platform. The Multi-Processor Architecture Extension System Platform reportedly allows users to mix and match up to six complex instruction set computing and reduced instruction set computing processors while retaining compatibility with such buses as the Micro Channel Architecture, Industry Standard Architecture, Sbus and VME bus. An Intel Corp. 80486-based system could provide up to 70 million instructions per second of processing power, Chips and Technologies President Gordon Campbell said.

……

Chevron signs AT&T, Hughes

AT&T and Hughes Network Systems last week won out against IBM and MCI Communications Corp. on a contract to provide networking and network management services to Chevron Information Technology Co. The contract calls for providing the parent Chevron Corp. with $50 million per year in customized network services, including satellite-based networking from Hughes and an AT&T Tariff 12 offering. Chevron said it expects AT&T to provide a network management solution based on its Accumaster Integrator product but has yet to determine whether the vendor will simply provide tools for an in-house management system or take over responsibility for managing Chevron's network.

NCR bowls down SAA alley

BY ELLIS BOOKER
CW STAFF

NEW YORK — NCR Corp. outlined its cooperative computing architecture last week, entering the territory now held by IBM and its Systems Application Architecture (SAA).

Hoping to take the high ground, NCR said its OCCA, or Open Cooperative Computing Architecture, will be based solely on open interfaces and standards and will not be dependent on NCR hardware.

NCR Chairman Exley

NCR Chairman Charles E. Exley Jr. said users have also expressed an equally strong desire to move smoothly from conventional mainframe approaches to microprocessor-based distributed systems. According to Exley, NCR conducted its largest market research study ever, contacting some 3,000 organizations to validate its current strategy.

The five-layer OCCA architecture consists of the following components:

- A human interface dubbed the NCR Desktop.
- An applications development environment.
- A cooperative services layer for database access, remote applications, network management service and network delivery services such as electronic mail and facsimiles.
- A communications services layer for handling local- and wide-area network connections.
- A base platform composed of hardware, operating systems and physical network.

Like SAA, OCCA is based on a client/server model. NCR, which said it put its first client-server computer system in place in 1985, will support DOS, AT&T Unix System V and OS/2 — but not OS/2 Extended Edition — on clients and Unix and OS/2 on servers.

While NCR officials took great pains to differentiate OCCA from IBM's SAA — the architecture with which it will inevitably be compared — actual comparisons to IBM's SAA-based Officevision must await for Cooperation, a suite of OCCA-compliant systems software products for the office, scheduled for release the second half of the year.

A 16-user implementation of Cooperation, not including hardware, will cost from $30,000 to $90,000; a 64-user system will cost from $90,000 to $180,000.

In response to NCR's commitment to openness, Michael Geran, vice-president of research at Nikko Securities International in New York, said, "Here's a firm with ten years of declining market share." "It's fair to say, given their market share, that they've got to go open," he said.

Toshiba hip-checks Compaq laptop

BY RICHARD PASTORE
CW STAFF

Battle of the dwarfs

Toshiba's latest portable goes head-to-head with Compaq's notebook system

	Toshiba T1200XE	Compaq LTE/286 Model 20
Processor	12-MHz Intel 80286	12-MHz Intel 80286
Weight	7.9 lbs.	6.7 lbs.
Battery life	1½ - 2½ hours	3½ hours
System RAM	1M byte to 5M bytes	640K bytes to 2.6M bytes
Hard drive	20M bytes	20M bytes
Floppy drive	1.44M byte, 3½ in.	1.44M byte, 3½ in.
List price	$3,999	$4,499

CW Chart: Doreen Dahle

Toshiba Corp. has taken on a formidable opponent in the notebook-size computer arena, aiming its two new units at Compaq Computer Corp.'s hot-selling LTE.

Toshiba, one of the pioneers of laptop technology, is challenging Compaq with an Intel Corp. 8086-based, 6.2-pound unit and a 7.9-pound box based on Intel's 80286 chip, both introduced last week.

The Toshiba computers "improve on the Compaq machines in some areas, but overall, they are fairly equal products," said George Thompson, an analyst at Datapro Research in Delran, N.J.

Toshiba's higher end notebook, the T1200XE, bests the LTE/286 Model 20 in screen size, maximum system memory and price, according to company specifications. It also bundles DOS 4.01 while Compaq charges as much as $89 for it. However, Toshiba falls short in battery life and weight (see chart above).

Bob Arakelian, MIS director at Godiva Chocolatier, Inc. and an LTE user, said he prefers to have a longer battery life. "Right now, I'm satisfied with Compaq," he said.

Stephen Rood, manager of microtechnology at Coopers & Lybrand in New York, who manages approximately 400 laptops, including both Toshiba and Compaq units, said Toshiba has an advantage because it offers users a direct support line. For Compaq support, users must go through their dealers.

Rood said he has found dealer technical know-how to run "hot and cold."

Toshiba may also have a short-term advantage if it can exploit Compaq's LTE/286 supply problems. Mike Swavely, president of Compaq North America, acknowledged that the firm will not be able to solve its supply problems and meet demand until the second quarter. Toshiba promises shipment next month.

Dodge hangs it up at M&D

BY ROBERT MORAN
CW STAFF

NEW YORK — The Dun & Bradstreet Corp. announced that Frank Dodge, president and principal executive officer of McCormack & Dodge, resigned last week.

Dodge, who co-founded M&D in 1969, was slated to assume the role of vice-president and director of Dun & Bradstreet Software on March 1. He was not available for comment.

Last November, Dun & Bradstreet purchased MSA for $333 million and said that it would merge the two into a new division called Dun & Bradstreet Software.

"I'm disappointed because Frank is a very fine person, but this was between him and Dun & Bradstreet," said John Imlay Jr., the former MSA chairman now heading up the D&B unit.

Imlay said that he was now planning a reorganization that would solidify the two companies but denied rumors that D&B's operations in Natick, Mass., would be moved to Georgia, headquarters of MSA.

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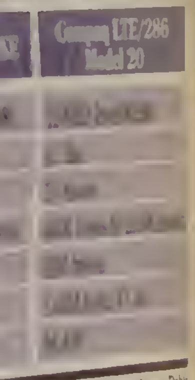
Compaq's notebook system


Compaq LTE/286
Model 20

CW Chart: Doreen Dahle

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IBM starts production of 16M-bit DRAM chips

BY JAMES DALY
CW STAFF

ARMONK, N.Y. — IBM announced last week that it has begun fabricating 16M-bit memory chips on existing production lines, thus cooling concerns that the next generation of dynamic random-access memory (DRAM) chips might require an elaborate extension of current manufacturing methods.

In a separate announcement, IBM also said it has started shipping IBM-manufactured 386 processors in selected models of the IBM Personal System/2 Model 70. The IBM 386, currently manufactured in 16- and 20-MHz versions, is the result of a technology exchange agreement with Intel Corp., which allows IBM to manufacture its own version of Intel's 80386 processor. IBM said it will continue to rely on Intel for the bulk of its 386 needs.

The 16M-bit memory chip, which is four times denser than the most powerful memory chips now available, measures about one-third by three-quarters in. and can store the equivalent of about 1,600 pages of double-spaced typewritten text, according to IBM officials.

Analysts said the chip should drive the development of more powerful applications, which frequently harbor a large appetite for random-access memory.

The move also continued IBM's role as pacesetter in the memory chip business. The company was the first to manufacture the now-commonplace 1M-bit chips and less than a year ago unveiled the initial 4M-bit chips, which are just becoming available in large quantities.

IBM did not set a date for commercial availability of the 16M-bit chip, which will be manufactured at the firm's Essex Junction, Vt., facility. But IBM spokesman Paul Bergevin said it will take about two years to see direct applications of the new technology across the board from mainframes to personal computers.

The new chip uses CMOS technology to build circuit patterns 200 times thinner than a sheet of paper, IBM officials said. The IBM 386 chip also uses CMOS technology.

Although the move was hailed by analysts for its technological achievements, IBM does not make its chips available to other computer makers. As such, it is unlikely that the announcement will have any effect on the dominance of the DRAM industry by Japanese and Korean firms.

Export rulings take some heat

BY J. A. SAVAGE
CW STAFF

SANTA CLARA, Calif. — The U.S. Department of Commerce's proposed supercomputer export classification was blasted by vendors of both mainframes and personal computers last week.

Vendors charged that the proposed regulation would make exports, such as the 3090 class of mainframes made by IBM, Amdahl Corp. and Hitachi Data Systems, subject to special licensing requirements that would restrict the users and use of the machines. Current export regulations do not apply to mainframes shipped to approved countries.

The restrictions would also require security measures in some cases, including having a U.S. representative keeping a 24-hour watch over the computer.

Apple Computer, Inc. and Intel Corp. representatives said their companies would not be affected immediately by the plan but told Under Secretary for Export Administration Dennis Kloske that their desktop products would fit the department's definition of a supercomputer within the next few years.

The restrictions result from concerns of military and other agencies, such as the National Security Agency, that these computers could be used to develop weapons to be used against the U.S. Despite the thaw in relations with Eastern Bloc countries, they still would not qualify for supercomputer exports.

Sticky situation

Kloske said that the Commerce Department was in the sticky situation of trying to satisfy security concerns while keeping U.S. technology available on the world market. He added that the department had started out with a higher base million floating-point operations per second (MFLOPS) rating and that in compromising with security concerns, that rating was dropped to 100 MFLOPS.

The industry generally backs a proposal by the American Electronics Association to set the export control limit at 25% of the average of the two highest performing supercomputers in existence and that it be no less than 300 MFLOPS. Failing that, vendors urged the Commerce Department to reevaluate its threshold quarterly.

While Commerce is haggling over the exact MFLOP rating for exports to friendly nations, the State Department agreed last week to work on easing restrictions on computer exports to Eastern Bloc countries. According to a statement from the department, details have yet to be agreed upon.

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COMP.WORLD

Users reap Netware fest rewards

BY JOANIE M. WEXLER
CW STAFF

BOSTON — The rash of Netware-related announcements appearing at last week's Networld '90 show reinforced the concept of strength in numbers — at least for Novell, Inc. local-area network users.

Many vendors have apparently seen the wisdom of tapping into the large Novell market — almost a half-million Netware nodes — to the benefit of users, who are getting broadened capabilities in such areas as client/server computing and electronic mail.

Racal Interlan, for example, announced its Limes gateway product, which will reportedly allow Microsoft Corp. OS/2 LAN Manager network operating environment users to transparently access Novell Netware file servers. Retix, a Santa Monica, Calif.-based maker of Open Systems Interconnect (OSI)-compliant and internetworking products, will provide Novell X.400-compliant software for bundling into the Message Handling System module of Netware 386. The software will allow Netware 386 users to communicate — via an X.400 gateway server — over wide-area networks with other X.400 users. X.400 is an OSI standard that standardizes the addressing and routing of messages between two messaging systems.

In another Netware-support product announcement, Compex, Inc., a Novell Netware OEM, announced plans to ship Compex Netware enhanced with small computer systems interface host adapters and Novell-certified device driver sets beginning next month. Adapters will be available for disk drive vendors Priam Corp., Seagate Technology, Micropolis Corp., Imprimus and Syquest Technology.

Also, Informix Software, Inc. announced that its Informix-Net connectivity software now delivers client/server capabilities to Informix database users of Unix-based servers running on Netware LANs.

Insurer's

CONTINUED FROM PAGE 1

The capital expenses of the LAN-based systems come to $300,000, or 10% of the cost of the mainframe, Read said. Operating expenses are expected to be reduced by $1 million per year, he added.

Users are the other major beneficiaries of Consolidated's migration to LANs. Joseph McNally, a controller at the firm, was "ecstatic" about his new ability to download his own data into a PC application, instead of having to plod through canned reports or wait for IS to get around to his query. "DP no longer holds the key to the DP shop; I'm no longer at their mercy," McNally said.

However, Read's group made sure that users' new freedoms did not jeopardize mission-critical applications on the new system. For example, users do not work directly with corporate files. Instead, they download what they need onto a scratch-pad file. This way, if they happen to delete a file, "they are only hurting themselves," Read said.

Consolidated got on the downsizing road almost by accident, Read said. The LANs were initially set up just to handle word processing and electronic mail, but IS kept finding other LAN-based applications that seemed to work better or more cheaply than the mainframe versions.

"Things just snowballed," Read said, particularly after management had a chance to see how well the first few applications worked on LANs and realize "we can now do things in a day that would take a week on the mainframe," Read said. Once this happened, "they gave us the green light" to implement the more complex and mission-critical applications.

Consolidated was ripe for change because it had recently broken away from Beneficial Corp. in a management buyout, which gave the company "the opportunity to look at things in a new light and come up with new solutions," Read said.

The process lasted about a year, with a lot of overtime involved, Read said. Rewriting a mainframe application and converting its data to a LAN format took anywhere from six weeks for less sophisticated systems to six months for a credit insurance system, even with the help of such development tools as Nantucket Corp.'s Clipper.

Consolidated would probably have kept its more complex systems on the mainframe if it were not for the emergence of Intel Corp. 80386-based servers, Read said. Four of these working in tandem equal the processing power of a 3090, he added.

The company currently uses two 33-MHz 386-based personal computers from Advanced Logic Research, Inc., plus five Novell 80286-based servers. By the end of March, the seven servers will handle all of the company's applications, Read said.

The migration to LANs would have been a lot more costly if Consolidated's entire IS department had quit, because the company would have had to hire expensive consultants, Read said.

As it was, more than two-thirds of the 30-person IS staff decided to go elsewhere. "But the few who came over [to the LAN side] made things easier because they understood how things worked on the mainframe." Consolidated did hire help from Computer Support of North America, a Basking Ridge, N.J., network systems integrator.

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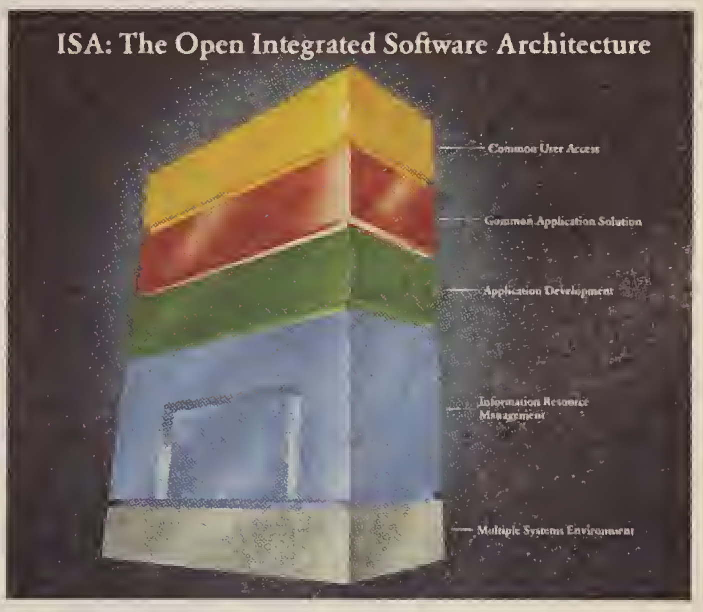
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Microsoft eases documentation overload

BY CHARLES VON SIMSON
CW STAFF

REDMOND, Wash. — Microsoft Corp. announced a change last week in its applications licensing agreement that means customers will no longer be required to accept delivery of software documentation and disks for each copy of an application they use.

Instead, companies can purchase a Microsoft License Pak from resellers for each additional user they wish to license for an application.

The License Paks, to be available from resellers by March 15, will consist of a card that activates the license agreement upon signature, a return envelope, a license card that must be kept by the user and a documentation order form (no disks or documentation are included in the package). Customers can then order documentation from Microsoft for each License Pak if they wish. Corporate customers must purchase at least one full packaged product for each application.

Under the new approach, an additional copy of an application can be made for users registered by License Pak, either by copying the disks directly, distributing the software over a network or copying it from a mainframe. The licensing agreement will also be somewhat more liberal, permitting licensed users to copy their application one additional time for laptop or home use.

Microsoft will pass the cost-of-materials savings on to customers, with a suggested 20%-per-copy price reduction for software purchased as a License Pak rather than in a full retail shrink-wrapped version. Microsoft currently offers no volume discounts.

Users from large corporations, most of which maintain extensive training and support networks that minimize the need for documentation, are welcoming the plan.

"I had to have 500 Excel boxes hanging around. I was the only banker with a forklift," said Arthur Block, vice-president at Manufacturers Hanover Trust Company in New York. Block manages 2,000 networked PCs for the bank. "In light of our electronic distribution, it didn't make any sense."

A Microsoft executive also acknowledged last week that within the next six months, Microsoft will bring its LAN Manager and SQL Server products to market through systems integrators.

"With the erosion of the Ashton-Tate relationship, it became clear that we would have to take more direct control of the product," said Scott D. Oki, Microsoft senior vice-president of U.S. marketing and sales.

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'Copyright'

CONTINUED FROM PAGE 1

"They say, 'If we don't protect our own programmers, why should we protect yours?' " McHenry said.

"We estimate that for every copy of Autocad sold [into the USSR], five are copied," said Sandy Boulton, an adjunct of Autodesk, Inc.'s antipiracy group.

The Soviet government gives the activity backhanded encouragement by employing programmers to rewrite popular application interfaces for use by Russian-speaking users. At one point, Ashton-Tate Corp. discovered five different versions of its Framework integrated software making the rounds in the USSR. Instead of prosecuting, Ashton-Tate officials tracked down the authors of the best adaptation and signed them to a marketing agreement.

Ashton-Tate will support a copyright obtained by the programmers, Sasha Barilov and Mikhail Figurin of the Leningrad Institute of Information, even though the development was unauthorized, according to Ashton-Tate.

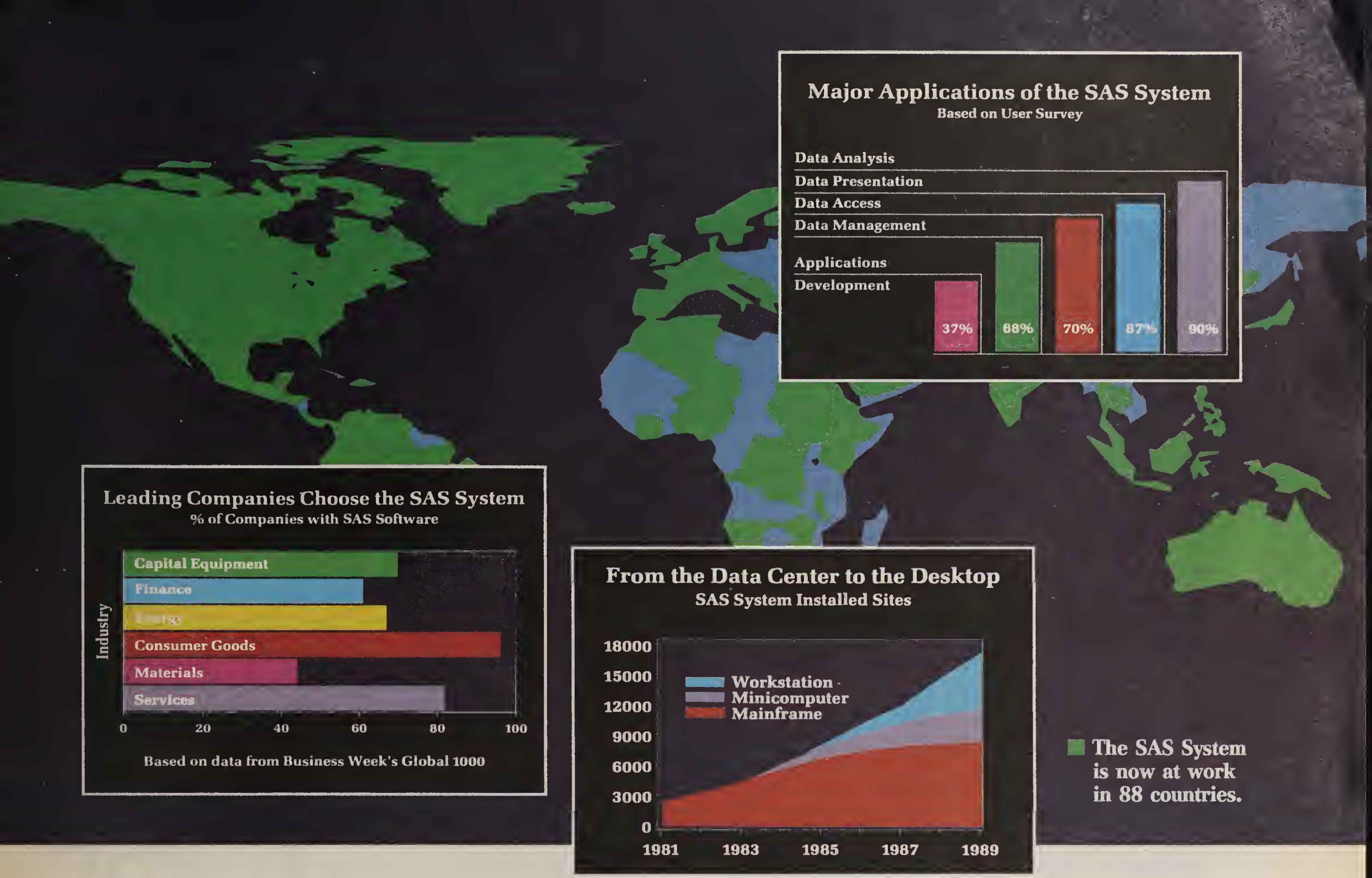
While there is widespread agreement that piracy is epidemic in the USSR, there is little agreement about what, if anything, should be done about it.

Business Software Alliance representatives, a consortium set up by Aldus Corp., Ashton-Tate, Autodesk, Lotus Development Corp., Microsoft and Wordperfect Corp., met in San Francisco last week to discuss how to defend against international copyright infringement. Participants said the Eastern Bloc piracy issue would be among the agenda items.

Help may be on the way from the Soviets themselves. Just over a year ago, a group of programmers and IS officials from the Soviet Union as well as U.S. vendors joined to establish the Pereslavl-Zalesky agreement, a code of ethics.

The impetus is that in a loosening market, "Soviet programmers see that they have the most to lose if copyright law is not enforced," Cavelyava said.

Some vendors who are still bullish on the Soviet market would like to settle the score with more capitalist tactics. Ashton-Tate is bundling its software with PC hardware as well as offering free upgrades to legitimate Dbase customers. Autodesk is selling Autocad with hardware locks, a tactic it abandoned in the U.S. The popular sentiment from U.S. software firms is that they are willing to forgive and forget past violations and instead concentrate on establishing beachheads in a potentially enormous market.



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ADVANCED TECHNOLOGY

Go wireless, corporate America

BY MICHAEL ALEXANDER
CW STAFF

If all of the wiring used in corporate America's local-area networks was ripped out and placed end to end, it would encircle the Earth 43 times, or something like that. The point is that there is a lot of wiring that goes into a LAN, and installing it can be a costly headache for network managers, especially when it comes time to add on workstations or reorganize office space.

Get rid of the wire, and you get rid of the headaches at the same time. That is the message from Photonics Corp., Agilias Corp. and a handful of other companies that have been touting the merits of wireless LANs, which are only now coming into use.

Photonics in Campbell, Calif., markets Photolink, an infrared transceiver that sends and picks up data between computers in a LAN or between terminals and a host computer. The device, which mounts on an office partition or on furniture, communicates with computers by bouncing pulses of light off a ceiling or other reflective surface.

The system uses a proprietary error correction scheme that blocks interference — from interior lighting, for example — and ensures that data is not lost should a passerby block the signal.

Data transmitted by Photolink moves as quickly and reliably as it would over cable, said Dirk Van Kuik, senior research engineer at Steelcase, Inc. The company, which claims to be the world's largest office furniture manufacturer, has been experimenting with Photolink on a remote workstation outside a cluster of eight Apple Computer, Inc. Macintoshes.

Up to four users can share Photolink, which is designed to work with Macintoshes in an Appletalk LAN and RS-232C terminal-to-host connections. Apple, which has invested some $6.5 million in the company, is an early and enthusiastic user of the product, according to Photonics.

Photolink *communicates by bouncing light off reflective surfaces*

Photonics said it plans to introduce Token-Ring and 3270 interfaces this year and Ethernet in 1991.

According to Chris Veal, a partner at Ernst & Young in San Jose, Calif., Photolink "is quite flexible and an appropriate alternative" to conventional wiring, but there are limitations. The accounting firm uses Photolink to connect two 12-node clusters of Macintoshes.

The device works best and is most cost-effective when used in an open office area, Veal said. The cost benefit drops quickly if the several units are required to "zigzag around corners," he said.

The installation costs are probably higher for a setup using Photolinks, which cost $995 per piece or $250 per node, than for a wired LAN, he said. "But the minute you start having to contemplate moving, the [wireless] LAN will pay for itself."

Dick Allen, the company's founder and developer of Photolink, said that users often underestimate the expense of installing a wired LAN, which can cost more than $1,000 per node. "Cabling is disruptive to install, a nightmare to rewire and is susceptible to data interception."

Allen said he first experimented with radio-based technologies but ran into problems with interference. He looked at spread-spectrum radio technologies but discarded them after discovering that they are not compatible with existing cable sites and would have been costly to install.

The wireless, infrared network is not a new idea, but early attempts at developing the technology were plagued with several problems that have only recently been worked out, according to the company.

Surprise! A computer with 'brain' waves

BY MICHAEL ALEXANDER
CW STAFF

It's not a thinking machine; it's not even artificial intelligence, but researchers at IBM said that a simulation of the brain on a supercomputer has unexpectedly produced electrical waves like those found in the brain itself.

The computer simulation was designed to imitate 10,000 cells in the brain's hippocampus, an area that is essential to the formation of memory as well as the origin of epileptic episodes, according to researchers.

The surprising result suggests that researchers may be able to do more sophisticated simulations of the brain on computers as well as help further research in the design of tomorrow's computers.

The study is being conducted on an IBM 3090 supercomputer at the Thomas J. Watson Research Center in Yorktown Heights, N.Y.

"When I was starting out, we only used the model to confirm things that we saw in the lab," said IBM scientist Roger Traub, who along with Columbia University researchers Richard Miles and Robert K.S. Wong, devised the experiment. "Now we are beginning to do experiments on it as if it were an organism in its own right."

The most startling aspect of the waves — technically called population oscillations — is that no one understands precisely how they are generated, whether by the supercomputer model or by the brain. The fact that the waves spontaneously arose in the supercomputer model, however, leads the scientists to believe that their model accurately simulates brain activity. The next step is to use the model to discover cause and function of the waves, the scientists said.

Traub's computer model contains complex descriptions of both the anatomy of single neurons and the way any pair of connected neurons is likely to interact. This approach differs from studies that concentrate on the whole organ or on details of the activity of single, randomly selected neurons. By examining the interconnections between neurons, Traub has begun to discover the way large collections of brain cells must work together.

Even with a supercomputer, the process remains slow. It takes months just to work out the anatomy of a single cell's connections, Traub said.

The supercomputer still requires several hours to crunch through a few seconds of simulated brain activity. Researchers also must try several hundred different simulations to analyze all of the possible results of a single experiment.

Traub's first computer model contained only 100 neurons arranged in a grid. But even this small-scale simulation accurately simulated real-life brain function.

LAN freedom

Agilis Corp. is cutting the cord on its portable local-area network technology.

Having already freed its computer clients from their desks with portable personal computers, Agilis plans to free LAN users from trailing wires. The Mountain View, Calif.-based company has released to beta-test site users battery-powered radio links for LANs. Bert Keely, marketing director at Agilis, said he expects to release the radio devices to the public this spring.

The radio modules will form 230K bit/sec. transparent bridges between Agilis workstations and any other system using Ethernet, Keely said. The modules are connected to the coaxial cable of the workstations or LANs to be linked. Keely said as few as two or upwards of 100 workstations can be linked with radio modules.

Agilis employs spread-spectrum radio waves to transmit data up to 100 meters indoors and one kilometer outdoors. Federal Communications Commission officials recently allocated 902 to 928 MHz, 2,400 to 2,483.5 MHz and 5,725 to 5,850 MHz for spread-spectrum radios. Agilis has divided 902 to 928 MHz into four channels for its radio modules.

The advantages of radio-linked LANs, Keely said, include mobility and ease of hook-up. On the downside are signal interference and interception. In changing electronic-pulse data on cable to radio waves in the air, he said, information is encoded and broadcast over a broad frequency band. Using broad frequency bands will lessen the chances of interference and interception.

Similar technology is in use by the U.S. military for communications, he said. Keely figures the U.S. Department of Defense to be "a hot prospect" for Agilis' product. He said the firm has targeted three roles in which radio-linked LANs would excel: portable maintenance, command and control, and industrial and scientific control. Agilis sees opportunities among its clients in automobile/airplane manufacturing, public utilities and safety agencies and transportation firms. Radio modules will be priced at about $2,500 each.

JIM NASH

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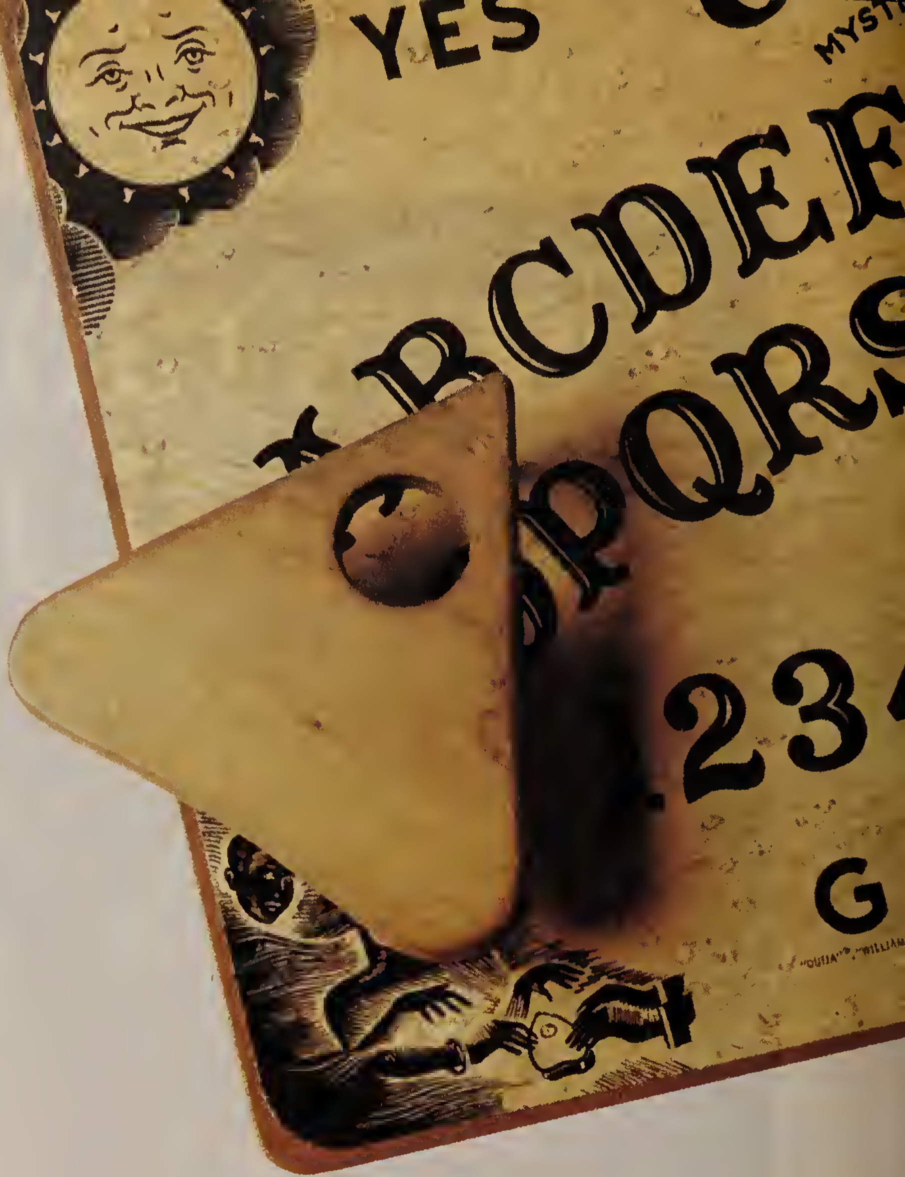

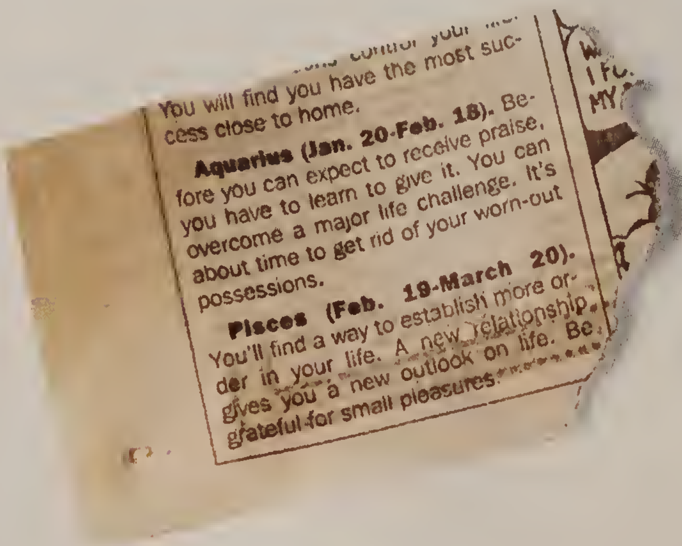

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EDITORIAL

The free market

IN OUR LAST issue, we used this space to offer our thoughts on the general direction any national high-tech policy should take. Inherent in that view is the belief that the government's role should be one that actively promotes the free-market principles and spirit of entrepreneurism that have made the 1900s the American century.

Last week, the industry served up positive proof that technological innovation is directly proportional to the level and intensity of competition, regardless of whether the product in question is commodity-like or intrinsically complex and therefore easily differentiated in the marketplace.

First came an announcement from IBM that it had fabricated a 16M-bit dynamic random-access memory chip on the same production line now producing the current generations of 1M- and 4M-bit chips. This news came less than a month after the collapse of U.S. Memories, the ill-fated chip consortium that was supposed to be a bulwark of this country's efforts against Japan, Inc.

The announcement also followed by about a month the news that Siemens and IBM would team up to jointly develop the next generation of DRAMs, the 64M-bit variety.

Somehow, the world lead IBM has earned was gained without the government's direct support. However, changes in the investment tax laws in the 1980s clearly promoted domestic research and development, which is what producing densely packed chips is all about.

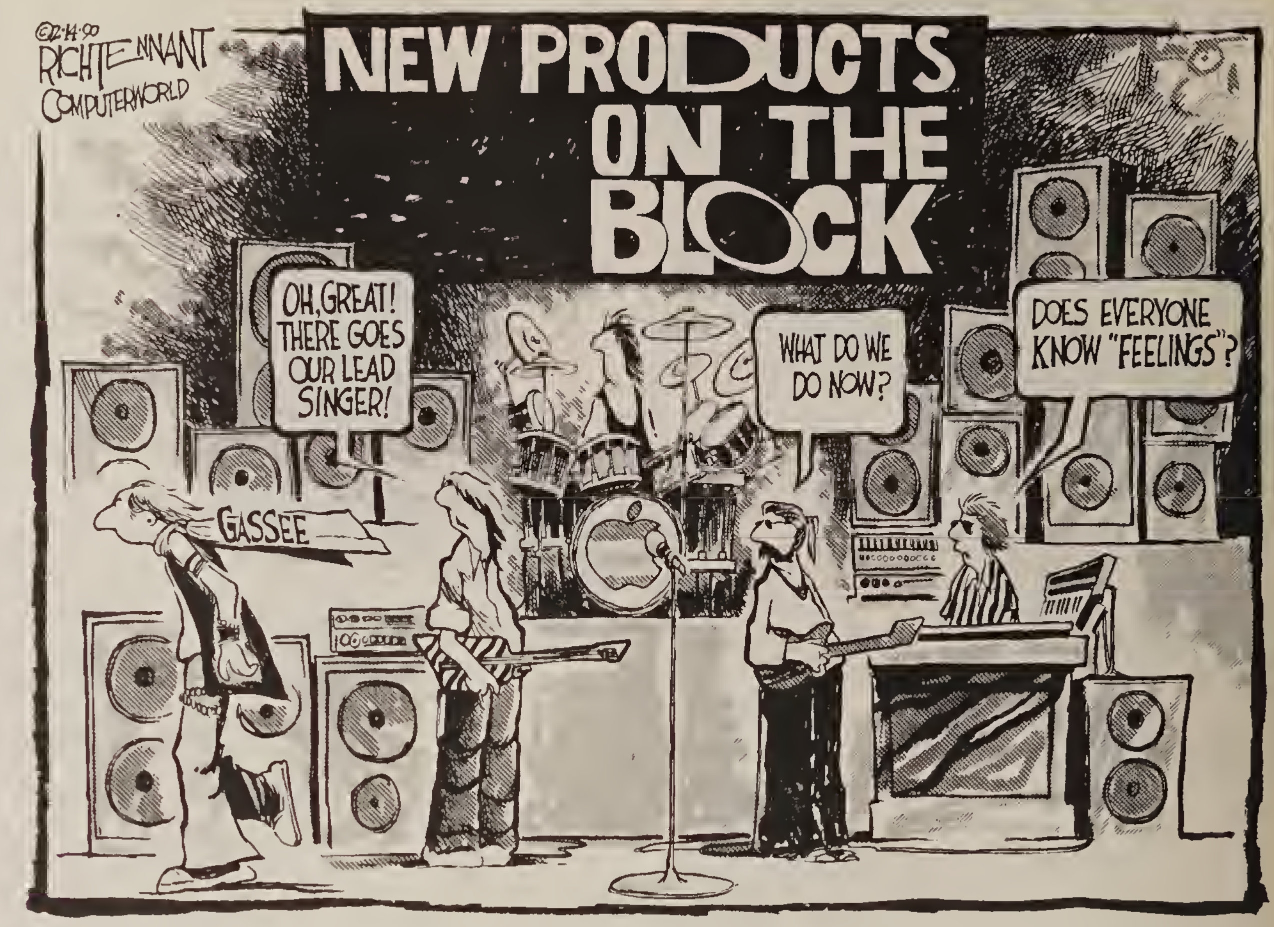
Then IBM took the wraps off its RS/6000 line of super-high-performance workstations in hopes of getting a piece of a hot market that has completely passed the company by.

The news here is not so much IBM's red-hot box or the reasonably impressive list of software developers making commitments to it. Rather, the news for the buying public is that the workstation price/performance war is about to escalate. Each of the big three in workstations — Sun, DEC and Hewlett-Packard — has served notice that they will not only meet but exceed IBM's challenge.

What a great time to be alive and buying computer hardware in a free market.

Editor's note: To steal a phrase from an old game show, the password is "integration." Computer vendors, information systems consultancies, value-added resellers and the like are fervently spreading the integration gospel. Meanwhile, customers are struggling to figure out just what the heck it means to them.

This week, *Computerworld* inaugurates its Integration Strategies section, which will run every other month. With this section, we will try to bridge the gap between the bluster and the promise of integration vendors and the realities of systems development and implementation in an increasingly distributed IS world.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DOES EVERYONE KNOW "FEELINGS"?

LETTERS TO THE EDITOR

Too negative

The lead article "IS frowns greet IBM service fee" [CW, Dec. 18, 1989] describing IBM's Softwarexcel services is unduly negative. They supplement, rather than replace, present services and facilities.

Since the first level of Softwarexcel is free, it hardly represents IBM's "ending the policy of bundling basic support in the software license fee." In fact, it indicates that IBM recognizes and is addressing the labor-intensive nature of system support by providing enhanced and automatic service facilities.

Softwarexcel is a continuation of IBM's efforts to make more information, easier interaction and faster problem responses available. Softwarexcel Basic, offered at no charge, provides electronic facilities that replace, at customer preference, tedious manual and error-prone procedures.

Softwarexcel Extended, a billable service, includes the above services and more, extending present services and, for some installations, reducing problem-related labor of installation staff.

As a long-time user of IBM hardware and software and as a vendor, I welcome these three services.

Gabriel Goldberg
Vice-President of Technology
VM Systems Group
Arlington, Va.

Too ambiguous

"Drowning in a sea of code" [CW, Dec. 25, 1989-Jan. 1, 1990] is about as helpful an article on the development backlog problem as would be random words neatly typeset. I read that "application backlogs in new systems written entirely in the high-level C programming language are negligible, thanks largely to the growing variety of CASE tools."

What is the special connection between computer-aided software engineering (CASE) and C? Code-generating CASE tools produce systems in various third- and fourth-generation languages (4GLs). Was I napping while researchers made the startling finding that C code maintains itself? Have C-code applications even been shown to be more easily maintained than equally well-written Cobol or 4GL applications?

Anyway, what does it mean for a "new system" to have "negligible" backlog? How new? How large? In what environment? This remarkable claim is so full of ambiguities that it becomes meaningless.

Adding insult to injury, the very next paragraph contradicts this extraordinary finding by quoting a market analyst who states, "I don't think CASE has made a significant impact on backlogs." What is one to conclude?

Leo Tohill
Director of Academic Computing
Pfeiffer College
Misenheimer, N.C.

Too harsh

Regarding the letter from John Spicijaric [CW, Dec. 18, 1989], in which he refers to programmers from India, we do sponsor Indians to work here and may too easily be tarred with the somewhat broad brush that he has chosen to use.

Unlike those to whom he refers, however, our software specialists are not "set up with lodging in a local YMCA" and "paid a very low wage."

Far from being "a more 'blue-collar' type," all of them have good university degrees. Many hold master's degrees in "hard" studies, such as computer science and mathematics. They can scarcely be identified with the "programmers that have been coding accounts-payable systems in Cobol with little secondary education;" not a few of them possess fourth-generation language and compiler skills.

They are not people who "would have done anything to have an opportunity to work in the U.S.," as Spicijaric puts it. They have already been engaged in computer work for at least three years, and usually considerably longer, before coming to this country. Many of them have worked in countries other than India before coming here.

I suggest that, instead of using language such as "importing cheap labor to bring down the standard of living for the profession" and thereby denigrating the opening up of the huge and highly trained resource of computer expertise that India represents (which has proven itself responsive to the needs of the U.S. and other Western countries), Spicijaric take a global and comprehensive view.

Raymond J. Spencer
President
Kanbay Resources, Inc.
Chicago

Computerworld *welcomes comments from its readers. Address all letters to Bill Laberis, Editor,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701. Fax: (508) 875-8931; MCI Mail: COMPUTERWORLD.*

Japan: A vital software market

BILL TOTTEN

Trade between the U.S. and Japan was one of the most important business and political issues of the last decade, and all the signs indicate that it will continue to be a major issue in this new decade.

In fact, competing in high technology has become synonymous with competing in Japan. Any company that wants to compete successfully in high technology today must be able to compete successfully against Japanese firms both in Japan and elsewhere.

This may seem discouraging to those who have read or heard about how difficult it is to compete with Japanese firms or to do business in Japan. However, my own experience has convinced me that Japan is not a difficult place to do business, and Japanese firms are not particularly difficult to compete against.

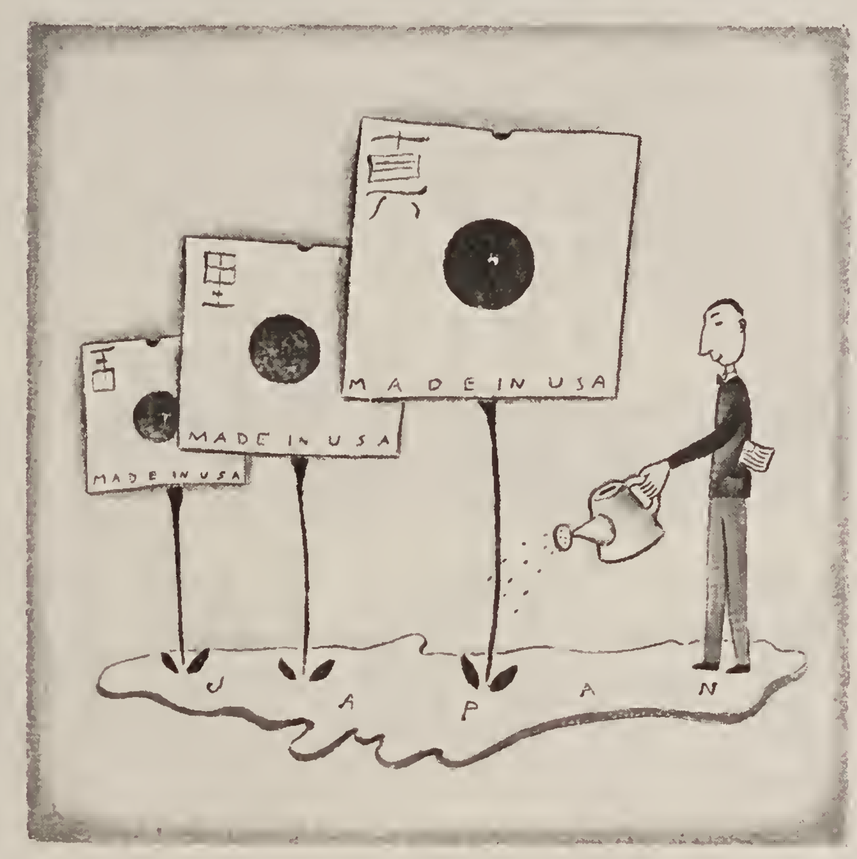
Some of the things I have read about trade problems between Americans and Japanese seem accurate. However, many others either overplay the difficulties of doing business in Japan or underplay the real underlying causes of so many U.S. failures in Japan.

My experience can illustrate some of the things that should be done, and some things that should be avoided, by U.S. software companies that want to do business successfully in Japan or that want to compete successfully with Japanese firms in the U.S. and elsewhere. First of all, it is vital for U.S. software companies to succeed in Japan for at least the following two reasons:

- Japan offers tremendous opportunities for revenue and profit. It is the world's second largest market for software products. It has 122 million people who live in a homogeneous society and speak a single language. These people, being highly educated, are heavy users of computers. Moreover, their use of computers is increasing rapidly.

Computer use must increase rapidly, because that is the only way Japan can avoid losing its industrial base to low-wage countries such as Korea and Singapore — just as the U.S. lost its own to Japan. Commercial and government leaders in Japan understand that Japan's current prosperity results from its industrial competitiveness.

They also understand that Japan stands to lose that industrial competitiveness, first to newly industrialized economies such as Korea and Singapore, and eventually to countries such as China and India, unless it can change the nature of industrial competition in a way that allows its strengths to continue to dominate.



Judy Glasser

Japan's greatest strength is its diligent and highly educated work force. That strength can dominate if industrial competition in Japan becomes more information-intensive. This means emphasizing the *knowledge* of what to make for whom and when and where rather than producing massive quantities of goods at low prices. Japan is converting itself into such an information-intensive economy.

This requires increasing the productivity of its 36 million office workers (61% of its work force) through the use of computers and software. For long-term prosperity, Japan also must teach computing to its future information workers — its 24 million students. That means equipping these students with computers and software. Thus, 60 million Japanese need computers and software, which translates into a tremendous market opportunity.

Moreover, Japan can afford to buy all the computers and software it needs. Its per capita income now surpasses that of the U.S. and every other large nation, and its capital spending exceeds that of U.S. companies (even though its population is only about half that of the U.S.).

In short, the Japan market offers too much opportunity for revenue and profit for any U.S. software company to ignore.

- U.S. software companies must succeed in Japan if they want to survive in other markets, including the U.S. market. U.S. software companies currently do not face much competition from Japanese software companies outside Japan. If U.S. software companies do not continue to succeed in Japan, they will lose this market to Japanese software

Continued on page 24

Totten is founder and president of K.K. Ashiuto, a major distributor of software in Japan. He has lived and worked in Japan since 1969.

A maturing AI is finding its way in the world

HARVEY P. NEWQUIST III

One of the technologies that has kept the skeptics tossing in their sleep during the past few years is artificial intelligence. Was it for real, or was it the bastard child of techno-crazed venture capitalists and university researchers? The 1980s played havoc with those who bought and sold the technology, challenging them to make it "real."

However, 1989 vindicated the AI community, and it stands ready to be one of the most important — and invisible — computer disciplines of the coming year. Important and invisible? Certainly. In the last year, large sections of corporate America have found that integrating AI into information systems has begun to reap the rewards prematurely promised in the early '80s. Once users began to realize that every intelligent system wasn't required to replicate the behavior of God, applying the features of expert systems and knowledge tools to more practical problems became a rather simple task.

The benefits of creating systems that would help banks make better loans finally outweighed the dream of creating HAL 9000 on every desktop. The results have been impressive in every realm of business throughout the world.

Transportation. Starting with the airlines, expert systems are being deployed by such carriers as United, American, Air Canada, Iberia and SAS to handle tasks ranging from gate assignments at specific airports such as O'Hare and Stapleton to scheduling aircraft maintenance and assembling flight crews. Portugal and France are using AI to more efficiently control train and subway operations, specifically in the area of scheduling. U.S. rail companies, long a beleaguered party in the transportation wars, are deploying expert systems to help with the assignment of engines and cars for use in specific carrier environments, such as contracted hauling or subleasing.

Finance. In no other area is AI more pervasive than in the financial services business. The Chicago Board of Trade now uses an automated intelligent system that can process trading orders after normal work hours, and some trading floor members have begun to experiment with voice recognition order systems, which minimize the time between taking and placing orders. More than three quarters of U.S. insurance companies utilize AI for some type of application, usually for claim processing or risk underwriting. Accounting firms such as Coopers & Lybrand have recently made its in-house tax expert system available as a service to large clients. Banks such as Wells Fargo are using the same type of systems to evaluate loan applications, as well as for continuous monitoring of investment portfolios.

Manufacturing. This area was one of the first to see the value of using machine intelligence to aid in the design, production and eventual diagnoses and maintenance of material goods. From Unisys and IBM to General Motors and John Deere, and on to Du Pont and Chevron, every major international manufacturer has trumpeted the success of some expert system over the past year or so. Du Pont especially stands as one of the standard bearers for the applied use of AI and claims to have hundreds of internal expert systems in varying stages of development and deployment.

Retailing. Mrs. Fields Cookies, that purveyor of high-priced tollhouse munchies, has been using expert system technologies so successfully over the last two years that the company has even created a software division to sell some of the AI applications that it created for everything from personnel interviewing to inventory management production forecasting. If all goes according to plan for Ford Motor, by the end of this year it may be putting expert systems into automobile dealerships. To minimize the amount of time cars spend in their dealers' repair centers and cut down on the number of unnecessarily replaced and returned parts, Ford is getting ready to put its expert system-based Service Bay Diagnostic System into those service centers.

Administration. The largest administrator of them all, the U.S. government, has expert systems in place at the Federal Bureau of Investigation and the Internal Revenue Service — both agencies are using AI to catch "bad guys" — and intelligent applications can be found in branches of the U.S. Department of Energy, the U.S. Department of Agriculture and the U.S. Department of Defense.

On a more corporate level, expert systems for human resources, especially policy systems that replace confusing manuals, have found a great deal of support throughout large companies with complex personnel and resource guidelines.

The list goes on and on. The Securities and Exchange Commission monitors corporate filing statements with AI; the Customs Department uses it to alert agents to possible money laundering operations. The British Police Force uses a system called Diana to analyze intelligence data. The National Aeronautics and Space Administration monitors Voyager's on-board operations with an intelligent diagnostic system, and Dow Jones is exploring the use of natural language text retrieval for its on-line information service. Security Pacific investigates automated teller machine fraud with AI, and Alcoa regulates the consistency of manufactured sheet aluminum.

None of these applications sound at all like the frivolous or whimsical applications the naysayers predicted during the 1980s, do they?

In light of the bizarre events and episodes that heralded in the 1990s, applying the most advanced technology to some of the most traditional practices is almost anticlimactic.

Newquist writes and consults on artificial intelligence and other advanced high-technology topics from his office in Scottsdale, Ariz.

Totten

CONTINUED FROM PAGE 23

companies. And if Japanese software companies can capture their own market, they will gain both the strength and confidence to compete abroad.

In short, if U.S. software companies cannot win in Japan, they will have to fight elsewhere. Eventually, they will have to compete on their own home turf, against much stiffer competition — competition that has gotten strong by feasting on a market that the U.S. companies abdicated!

Unfortunately, I think that most U.S. software companies already are abdicating the world's second largest software market, Japan, to the Japanese. Most U.S. software companies simply do not offer their products for sale in Japan. Those that do sell their products in Japan are facing a bleak future. Why? Because they have grown so complacent after years of easy success without having to face any serious Japanese competition that it is doubtful whether they can and will make the tough decisions required to confront Japanese competition as it emerges. And it is emerging like an avalanche!

Japanese companies have begun producing software that is competitive with the best software products from the U.S. The following are reasons why they are starting to beat U.S. software products:

- They are comparable in functional capability to the best U.S. products.
- These Japanese software products generally have the same kind of quality we have come to expect from Japanese manufactured goods. They are more compact, operate more efficiently, are documented more clearly and contain practically no errors.
- They satisfy Japanese business needs, support the Japanese language and run on all computers that are popular in Japan. By comparison, most U.S. software companies consider only the needs of the U.S. market when they build their products. As a result, it usually takes a lot of time and money to "Japanize" these U.S. products to fit the business needs, the language and the computers used in Japan. This puts these U.S. software products at a severe competitive disadvantage.

In addition, most U.S. software companies doing business in Japan either hesitate or refuse to "Japanize" their products. These companies were able to do business in Japan when there was no domestic competition but, needless to say, they are now losing what market share they once enjoyed there.

- The Japanese products are fully documented in the Japanese language, using terms and examples familiar to every Japanese person. The documentation of imported products has to be rewritten. Mere language translation is usually insufficient, because most U.S. product documentation is filled with examples and colloquialisms that only Americans can understand.
- The Japanese use their intimate knowledge of Japanese business customs and economic conditions to set competitive prices and terms of sale for their products. Most U.S. software companies, even those that sell through a Japanese subsidiary or distributor, insist on setting prices and terms of sales at their U.S. head office (which has scant knowledge about Japan). As a result, U.S. products often are saddled with prices or terms of sale that seriously handicap their competitiveness in Japan.

Even worse, many U.S. software companies arbitrarily charge much more for their products in Japan than they do in the U.S. They could get away with this when there was no competition from domestic Japanese products, but they cannot today.

- Japanese software companies strive more for market share than short-term profits. They also recognize the critical importance of distribution in capturing market share. They supply their products to distributors at terms that enable the distributor to spend heavily to market the product aggressively and still earn a profit. The distributor typically pays its Japanese supplier a royalty of 10% of the sale price.

U.S. software companies seem more interested in short-term profits. They typically demand royalties of 30% to 50% of sale price, thereby inhibiting the ability of their distributor to spend heavily to market their products aggressively.

My company, K.K. Ashiuto, provides evidence of what is happening to U.S. software companies in Japan. Since its incorporation, K.K. Ashiuto consistently has sold about half of the independent software products sold in Japan. During our first 16 years in business, all of our revenue came from importing U.S. software products. In 1988, 99% of our revenue came from U.S. imports, and 1% came from selling Japanese products. In 1989, less than 95% came from imports and more than 5% came from Japanese products. This year, we are forecasting that less than 80% of our revenue will come from imports and more than 20% will come from selling Japanese software products.

Why has our business changed so dramatically? Because increasingly we are finding better products, which fit our market better, that we can distribute on better terms in Japan than we can find in the U.S.

Do the executives of the U.S.' leading software companies have the wisdom and guts to take the steps necessary to prevent their industry from sinking to the same depths as the U.S. steel, shipbuilding, home-appliance, automobile, semiconductor and various other industries? I hope so.

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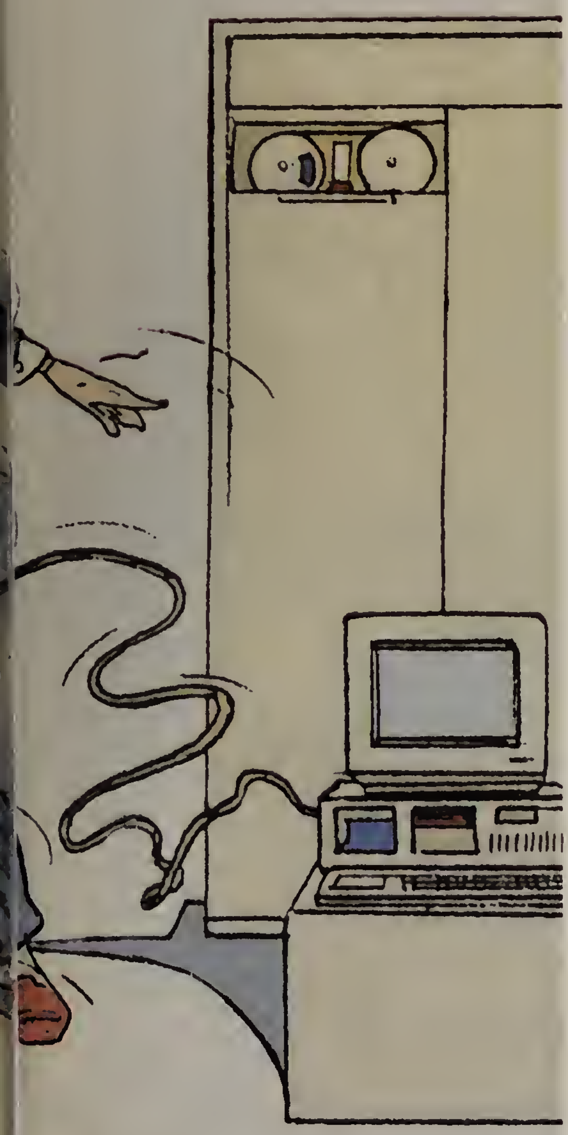
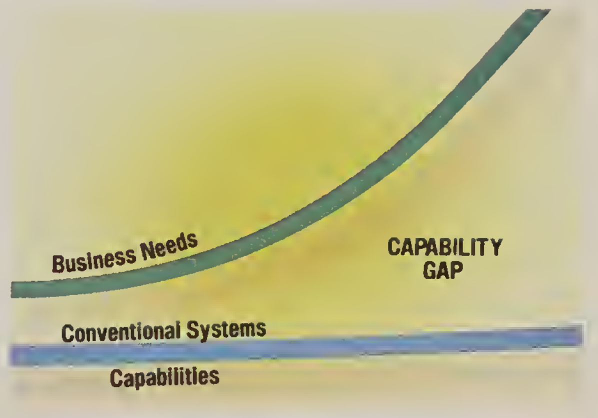


Increasing global competition and growing market expectations are confronting business with accelerating change, change that is reshaping the way businesses operate and compete.

The role of information systems in meeting these business challenges is changing, too, from a service function to a true competitive weapon.



Conventional computing strategies can't provide the capabilities needed for this transition. In fact, the gap between what business needs and what conventional systems can offer is continuing to widen.

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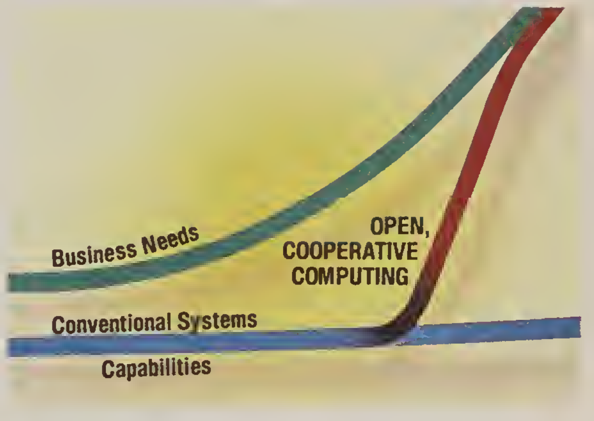

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HARD TALK

Rosemary Hamilton

Time to take control

If there are such things as happy endings, then the recent story in *Computerworld* about IBM customers calling the shots for midrange purchases could be one.

When we were first covering the Application System/400, then called Silverlake, there was a lot of confusion in the marketplace. Not only was it unclear exactly what IBM would do with its two distinct systems, the System/36 and 38, but there was yet another midrange offering to think about from the System/370 world, the 9370. Customers struggled to make sense of this, with some even holding off purchases until IBM cleared the air.

To hear customers now speak decisively and focus on their own plans was a welcome change.

Of course, that is not to say that high-pressure sales practices from IBM and other vendors no longer take place. They do. We've unfortunately heard of some just within the past few months. And many customers still look to IBM to tell them what to do.

However, there is hope that more and more customers are seeing that they can be in charge and that it is up to IBM to fit their plans. Recent interviews with customers showed this, and interestingly enough, conversations with IBM are

Continued on page 40

Tape automation comes of age

ANALYSIS

BY ROSEMARY HAMILTON
CW STAFF

For plenty of data center managers, tape is very much a four-letter word.

The management, storage and retrieval of tape has long been a hassle. For years, managers have fine-tuned their manual systems, hoping to make them more efficient, while vendors — most notably IBM — have made unsuccessful attempts to sell tape automation systems.

Then along came Storage Technology Corp. in 1988 with its Automatic Cartridge System (ACS), a single unit that manages thousands of tapes, and a new era of tape automation began. During the last two years, users have finally begun the move away from manual systems that involved the very boring, time-consuming and error-prone task of handpicking tapes.

Storage Tek capitalized on advancements in robotics and software and used some common sense, like maintaining compatibility with the majority of tapes used in data centers.

"This is the next one to come along and make a big attempt to automate tape management," said Ray Freeman, president of Freeman Associates, Inc., a storage consulting firm in Santa Barbara, Calif. "This one seems to be pretty well accepted."

However, while Storage Tek virtually owns the market today, that won't last long. Memorex Telex is ramping up with its own system, the 5400 Automated Tape Library, and has shipped 30 units since July 1989. Meanwhile, speculation continues that IBM will give it another try (see story page 40).

In less than two years, Storage Tek has sold nearly 1,100 systems, to a tune of nearly $500,000 a piece. The company apparently pushed a hot button.

Storage Tek 4400 *houses 6,000 cartridges*

"They announced it and I said, 'This has gotta be the way to go,' " said Frank Stairiker, a senior staff consultant at National Liberty, a direct mail insurance products provider. "It's a more reliable tape operation. I don't think we've had a single tape-related disaster since installing these."

With two Storage Tek units, Stairiker said he has cut staff and improved his average tape-mount time from two minutes to 37 seconds.

"There's an incredible morale benefit," he said. "The operators don't go home tired, they aren't running around trying to find tapes. We've been able to reassign them so they can start to learn other jobs."

Put simply, the tape automation concept from both Storage Tek and Memorex calls for housing thousands of tapes in a single enclosure and relying on a robotic arm to find the tapes, mount them on the drive and return them.

However, the two took this concept in very different directions. The Storage Tek unit is a

Continued on page 40

IBM pumps up AS/400 in face of Unix challenge

BY ROBERT MORAN
CW STAFF

Stephen Schwartz, IBM vice-president and general manager of applications business systems, recently declared that during the next five years IBM will target the Application System/400 at small and intermediate-size organizations — and, by implication, Unix competitors making inroads on the same turf.

"It is ironic to me that the richness of the AS/400 and its operating system, and the cost of developing and maintaining a proprietary operating system, have driven a number of commercial systems manufacturers to stop developing proprietary operating systems," Schwartz said.

In a surprising declaration he added, "We see them in Unix not because there is a hue and cry in the marketplace but because they are having trouble competing with the AS/400."

Schwartz characterized the midrange as multiuser transactional systems ranging in cost from $100,000 to $1 million and said IBM expects that market to grow 19% to about $33 billion over the next two years.

According to Schwartz, that market represents about "60% of the opportunities in new markets" for IBM's AS/400, which boasts both ease of use and a portfolio of between 5,000 and 6,000 applications.

"Someday the Unix vendors will have multiuser commercial applications portfolios as broad and as rich as the AS/400, and they will be as easy to use as the AS/400," he said. "They aren't today and will not be for the the next few years."

Signs of success

As evidence of the AS/400's mounting success, Schwartz said that in 1989 the entire applications business systems market posted double-digit revenue growth in all geographic areas. "We grew systems revenue for ABS [applications business systems] products 19% worldwide in dollars, which was about twice that of the rest of the industry."

Schwartz said some of the shipments were high-end AS/400s but many were low-end models, operating in large corporate networks attached to the 370 mainframes. He added that the AS/400's server capabilities were also major contributers to its success. "There are 1.5 million PCs and PS/2s already attached to [applications business systems]," he said. "Half of those are attached to the AS/400."

Inside

- Raytheon takes aim at paper mountain. Page 37.

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Raytheon readies attack on paper foe

ON SITE

BY MARYFRAN JOHNSON
CW STAFF

ANDOVER, Mass. — Managing a mountain of paperwork 500,000 documents high while Uncle Sam breathes down their necks has been business as usual for officials at Raytheon Missile Systems Division.

That mountain is now under siege from three directions.

A high-tech assault team is equipping the Andover plant with a computer-driven procurement system, imaging technology from Wang Laboratories, Inc. and an electronic data interchange (EDI) system.

"Once this is all developed and proved out, other defense contractors will want it," said Thomas Anderson, manager of material operations. "The technology is jazzy, but what is really critical to us is the timing, control and understanding of every piece of data we get."

The procurement system will eventually be sold as a general purpose application by Chicago-based Arthur Andersen & Co., which is using Raytheon as a beta-test site.

Serving the site where Raytheon manufactures Hawk and Patriot ground-to-air missiles, the procurement department at Andover buys roughly 25,000 different parts from more than 3,000 suppliers.

That means keeping tabs on requests for quotes, pricing information, purchase orders, bills of material and related paperwork — all of which must be stored for 10 years or longer for audit purposes. "We are accountable for everything to our customers," Anderson said. "We have to be able to do a final rollup of every piece of paper we've touched and make sure all the quotes the government has from us are the latest prices."

Toward that end, Raytheon began working with Arthur Andersen in late 1988 to develop "Procurement D," a procurement data processing software package that will run on the missile systems division's IBM 3090 Model 200.

The defense contractor is also ramping up its own EDI system and is completing installment of a Wang Integrated Image System (WIIS) to provide fast access to supplier documents.

The three systems, all of which are scheduled to be fully functional by the end of the year, will eventually work in concert with applications running on the IBM mainframe for the receiving, inventory clearance and manufacturing departments.

Although imaging, Procurement D and EDI began as separate projects, Raytheon managers are building the links now to combine them in a single application by 1992, said Jay Lapointe, manager of planning and administration for the procurement department. "Everything will reside on the IBM 3090," he noted.

"We're hoping that all the things we do intensively with paper, printed requisitions and so forth will all be on-line through Procurement D," added Robert Sexton, IS director for the missile systems division.

"Imaging will allow the vendor responses, which come in paper form, to be imaged and stored on optical disc," said Thomas Haynes, manager of factory support procurement. "In the future, it will all be done electronically."

Steven Lewis

Haynes (left) *and Lapoint plan assault with EDI, imaging*

That capability will dramatically improve Raytheon's negotiating posture with its government customers by providing efficient organization and quick access to data, Lapointe said. Whether it eventually leads to an entirely paperless process is up to the government, however.

"As long as the [government] auditor is not asking for hard copies and is accepting image media, we will slowly move to a paperless environment," Lapointe said. "But we cannot say now that we'll keep the paper around one year and throw it away."

With the mainframe generating quote requests for suppliers, the suppliers' responses will be fed directly into the Wang imaging system, Anderson said. The host mainframe and the VS minicomputer interface automatically via a Systems Network Architecture gateway to share data.

"When pricing comes in from the vendor to the Wang VS, the system knows the response is due in, so there's no need for a manual link," Lapointe explained. If a document arrives through Wang's Fax Gateway, however, a Raytheon analyst must identify and index the paperwork.

"Using imaging for proposals is only the beginning for us," he said. "This system has more far-reaching applications throughout our plant, such as incoming inspections. The more we learn, the more this will spread."

The EDI operation is based on Raytheon's own system, which is in a test phase with the installation of the first of several Intel Corp. 80386-based IBM-compatible PCs. The company is considering using EDI software from General Electric Co.

Raytheon officials see EDI as the answer to efficient handling of small dollar procurements of less then $1,000. "Those are a high percentage of our volume," Haynes said. "The EDI is not so important in transmitting the data as in organizing it."

Hitachi: Trying to get back in step with mainframe elite

ANALYSIS

BY J. A. SAVAGE
CW STAFF

In the mid-1980s, the mainframe game consisted of three major players — IBM and competitors National Advanced Systems and Amdahl Corp. — that waged a war of capacity. As soon as one broke a capacity barrier, another was ready to leapfrog it.

Then, suddenly, NAS stopped jumping. Currently, the company, which bears the new name of Hitachi Data Systems, lags behind its rivals by a good 20 million instructions per second (MIPS). Its most recent mainframe, introduced in 1988, runs at about 88 MIPS, whereas Amdahl's and IBM's high-end mainframes, introduced last year, run at more than 100 MIPS.

There are differing opinions on how HDS became a mid-range mainframe company and where it will go from here, but most analysts agree on two points: NAS' lack of marketing expertise ground the company to a near halt, and HDS will soon attempt to remedy the situation with a high-end system.

NAS was owned by National Semiconductor Corp., which fell on difficult economic times in the late 1980s and put NAS up for sale. NAS had no manufacturing infrastructure, primarily acting as a marketing arm for Japan-based Hitachi Ltd., according to HDS. NAS was sold to Hitachi, as a majority owner, and systems integrator Electronic Data Systems last year.

Despite greener MIPS in other pastures, HDS users have not abandoned the firm in search of more CPU power. Partly, they have been able to wait out the change in ownership because they began with a high-end model in 1987-88 and are just beginning to be CPU-constrained — for example, Crowley Maritime Corp. in San Francisco. Others bought lower-end mainframes and have been satisfied with HDS' current upgrade offerings.

Power users — those who need the biggest of everything as soon as it is available — tend to have mixed plug-compatible mainframe shops already. Users said that since any MVS application should run the same on Amdahl's, IBM's or HDS' mainframe, if one machine runs out of MIPS, then the application can be transferred to another machine. Thus, if a job becomes too big for an HDS mainframe, it gets reassigned to another vendor's machine, and the HDS mainframe gets an application with lower MIPS requirements.

Small is beautiful

The downsizing trend has also kept HDS users in the fold. For instance, instead of buying a bigger mainframe, Bear Creek Operations in Medford, Ore., kept its HDS mainframe and is adding 30 local-area networks [CW, Feb. 5].

The lack of a high-end mainframe to match IBM and Amdahl has not resulted in poor sales, HDS claimed. Although it sat in the doldrums before sailing into Hitachi's fold, HDS President Gary Moore said that now the company is selling every AS/EX 100 (the company's high-end mainframe) that it can get from Hitachi — an estimated 300 CPUs for all models in 12 months. During the transition, sales of disk drives have also remained strong, representing nearly 50% of the firm's revenue, according to a spokesman.

Building the hardware to keep up with Amdahl's and IBM's high-end mainframes has not been a technical problem for Hitachi Ltd. At least one research organization, Gartner Group, Inc. in Stamford, Conn., believes that the company built a high-end mainframe (internally named Andromeda) last year. However, HDS never introduced that high-end mainframe. The Gartner Group said it blame a year of indecision over the fate of HDS' predecessor.

"HDS was very competitive up until [IBM's] S model. When the S model was introduced in 1988, National Semi was in deep trouble. There were rumors of the sale of NAS. Hitachi was looking at its primary distribution channel that was in danger of going down the tubes," Gartner analyst Mark Hess said.

However, even when HDS introduces the high-end hardware — which Hess said he expects this spring — the lack of a marketing infrastructure will keep HDS from being accepted in the market, according to analysts.

"In order to move up the line, they [not only] have to have machines, they have to have a sales force that can call on high-end, elite managers. In order to do that, they have to have a better image," said Bob Djurdjevic, president of Annex Research, a Phoenix-based consulting firm.

Djurdjevic said the lack of marketing expertise — and at the old NAS, the lack of a marketing department — failed to drive Hitachi to release hardware.

An HDS spokesman said that in the NAS days, the company had little communication with Hitachi Ltd. There was also a question of how much credence Hitachi Ltd. attached to NAS' information. As a part of Hitachi, that has changed, Djurdjevic said. Communications are still formalized but much more frequent. Also, HDS has beefed up its marketing department.

"Hardware is the quickest thing to change, but that alone won't do it," Djurdjevic said. "Marketing moves will take a year or two at best, and upgrading the sales force is another long-term project."

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Automation

CONTINUED FROM PAGE 33

round silo that houses up to 6,000 cartridges. A dual camera, bar-code reading robot is at the center, and it swings around reading and pulling tapes. Additional units can be added, and tape can be swapped between them.

Memorex uses a linear system with two robotic arms. The company also uses a modular approach, starting with a 15-foot unit that manages 650 tapes, which can be expanded to a 5,000-tape unit.

"In the event of the death of one robot, the survivor will go over and push the dead robot into its garage and take over all operations," said Dan Kaberon, manager of performance management at Hewitt Associates in Lincolnshire, Ill. Hewitt was a beta-test site for Memorex.

Kaberon asserted that the Memorex unit is far superior to the Storage Tek one. He claimed that he has achieved faster access times and more reliability. For example, the Storage Tek robot reads external bar-code labels on each tape cartridge to identify it while the Memorex unit mounts the tape to read its internal identification. Kaberon acknowledged that bar-code reading is quicker, but he also said that it can lead to human errors, because people label the tape.

The Memorex advantage, however, still needs the test of time. Hewitt Associates is one of 30 customers, compared with the 430 Storage Tek customers.

Debates of access and mount times aside, users of both units see more than the current benefit of a more efficient operation.

By greatly improving tape storage, users can end up saving money on disk storage. Oftentimes users will store moderately critical data on disk because they don't want to be bothered with the slow access time associated with tape. Users report the ACS will allow them to shift that moderately critical data to tape and then use DASD space for new data.

And IBM?

Will IBM introduce another tape automation system or won't it? The debate continues.

While some analysts claimed that IBM has no choice but to respond to a strong market demand, others claimed it will not give in. They asserted that it is in IBM's best interests to downplay the role of tape and promote the use of disk storage because disk drives cost more.

The official word from IBM is that it will instead continue to offer tools that "improve traditional tape processing." A spokesman cited the examples of automatic loaders, increased capacity on a cartridge and system-managed storage.

Yet some users and analysts recently pointed out a curious thing: A 3480 tape drive required service from the front, which made it nearly impossible to be included in an automated system. The 3490 drive, introduced in late 1989, can be serviced from the rear.

Whatever its next move is, IBM needs to be better prepared to tackle the market than it was the last time, analysts said.

Storage Tek sold more ACS units in two years than IBM sold of its now-defunct 3850 in a 10-year span, noted Ray Freeman, president of Freeman Associates, Inc.

The 3850 was IBM's automatic tape system that was never very high-profile because it was incompatible with the standard tapes and was mechanically unreliable, said Gartner Group, Inc.'s Nick Allen.

ROSEMARY HAMILTON

Hamilton

CONTINUED FROM PAGE 33

showing it as well.

On the surface, it sounds like marketing hype, but IBM executives are talking more and more about selling whatever system best suits a customer's needs.

It wasn't that long ago when IBM spokesmen would never venture beyond their assigned areas of coverage to comment on other product lines. Now, it's not unusual for a spokesman to point out which environments would be more suited for a 9370 vs. an AS/400.

Stephen Schwartz, the head of IBM's AS/400 operations, pointed out in an interview last month that IBM no longer sells machines, but complete solutions to match a customer's needs.

OK, OK. Solutions is a horrible marketing word and really should be banned. But to put it in context, the comment came during a conversation in which Schwartz was pointing out the strengths and weaknesses of the AS/400 and IBM's new Unix offering, the System/6000.

This is unusual. IBM executives typically don't acknowledge any weaknesses, period. In fact, Schwartz pointed out that it's not so much IBM's hardware that sold AS/400s, but the huge library of software, most of which comes from third parties. "There are very few customers who bought the AS/400 just to buy the AS/400," he said.

Again, good news. That means both IBM and customers are understanding something. Customers are getting smarter and smarter. They are selecting the system that makes sense to them, rather than the one IBM recommends or bullies them into buying.

So, for a customer the size of Canadian Pacific or Metropolitan Life Insurance, an AS/400 doesn't make a lot of sense, and that's the bottom line, no matter what IBM says.

However, for a small firm like Cannondale Corp., a maker of bicycles and accessory products in Georgetown, Conn., there are another set of needs entirely. All it needed was a few midrange-class systems to function as the main host and distributed systems at its three facilities. The AS/400 suited this company fine.

The AS/400 keeps all three facilities running in the same environment (there had been a System/36 and 38 mix). It also requires fewer technical people to manage, saving Cannondale support costs at its remote facilities.

Hamilton is *Computerworld's* senior editor, systems.

Client/Server Architecture What is it? And what are its benefits?

The Sybase View

Client/server architecture is an approach for managing database applications with efficiency, flexibility and control. Specifically, client/server software divides monolithic applications into discrete, reusable and sharable components.

Clients and servers are independent of each other and yet are fully interoperable. The client component handles the user interface and local data manipulation, while the server component provides data management services for multiple clients. The client and server components can run on the same computer or on different computers that communicate transparently over a network.

When client/server architecture is fully implemented, it allows companies to save money and gain a competitive edge in several ways.

- It simplifies and speeds application development
- It provides a control mechanism for managing data
- It supports third party applications and tools
- It integrates external sources of data
- It leverages the cost savings of hardware downsizing

It's important to note that only a full implementation of client/server can deliver all these benefits. While other database products may operate over a network, only SYBASE fully supports client/server with the following capabilities.

PROGRAMMABLE SERVERS. Other database products require each client application to correctly implement an organization's approved business transactions and enforce its business rules. With SYBASE these functions can be programmed centrally—in the server—and shared by all client applications. This approach eliminates redundant coding, facilitates maintenance, and provides a central point of control to protect corporate data.

COOPERATIVE SERVERS. By supporting direct server-to-server communication, SYBASE servers can work in concert without the intermediation of a client application. For example, one server can ask another server to check a potential customer's credit rating before accepting an order. This capability allows organizations to effectively manage data consistency among systems without having to police all application programs, as other database systems require.

OPEN SERVERS. The SYBASE OPEN Server allows both clients and servers to communicate with other relational DBMSs, non-relational DBMSs, file systems, existing application programs, real time data feeds, and other application services. Because SYBASE provides an open interface, companies can implement the exact functionality and/or performance they require. This SYBASE approach contrasts with other proprietary and inflexible "one size fits all" connectivity strategies.

Client/server is far more than a feature. It is an architecture. And only a complete implementation of that architecture can deliver the productivity, control, integration, and cost savings that today's on-line business environment demands.

SYBASE is the only database system to offer such a complete implementation of client/server architecture—with all its attendant benefits—today. That's why SYBASE is the undisputed leader in client/server database management for on-line applications.

The Oracle View

(We regret that Oracle did not respond to our invitation to take part in the Forum. The accounting firm of Ernst & Young had not received Oracle's views on Client/Server Architecture by the deadline.)

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NEW PRODUCTS — HARDWARE

Processors

Pacific Cyber/Metrix, Inc. has announced a multiprocessor board designed specifically for high-speed digital signal processing (DSP) operations in a Motorola, Inc. VMEbus environment.

The DSP-2 board is supported by a built-in data-flow operating system — called FLOS — and includes an object-oriented programming platform. According to the vendor, a single VMEbus card cage can house a DSP system employing more that 50 DSP processors to provide a total performance output in excess of 800 million instructions per second and 1.5 billion floating point operating signals per second per card cage.

The product costs $11,448.

PC/M
6805 Sierra Court
Dublin, Calif. 94568
415-829-8700

Wyse Technology, Inc. has announced a midrange multiuser system that runs under the AT&T Unix System V operating system.

The Wyse Series 9000I architecture was designed to support tightly coupled symmetric processing and incorporates an Intel Corp. 80386 microprocessor. The computer can support as many as 128 users. A typical configuration for 64 users, with three CPUs, 32M bytes of random-access memory, a 1.2M-byte floppy disk and a 150M-byte tape drive, is priced at approximately $85,000.

Wyse
3471 N. First St.
San Jose, Calif. 95134
408-473-1200

Data storage

Emulex Corp. has extended its EPS pedestal-mounted subsystem product line to include an SMD-E, Digital Equipment Corp.-compatible controller.

The subsystems were designed for any noncluster environment, and each can be configured with one to four 8-in. SMD-E disk drives. Formatted storage capacities range from 741M bytes for a single-drive subsystem to more than 4G bytes for a high-capacity four-drive system. Pricing starts at $15,695.

Emulex
P.O. Box 6725
Costa Mesa, Calif. 92626
714-662-5600

Clearpoint Research Corp. has announced 12M- and 4M-byte parity memory upgrades for Hewlett-Packard Co. 9000 Model 350- and 370-compatible machines.

The HPME-93P/12 is user-installable onto the existing HP controller card and allows for a total slot capacity of 16M bytes.

The HPME-93P/12 and the HPME-93P/4 are priced at $6,500 and $2,500, respectively.

Clearpoint
35 Parkwood Drive
Hopkinton, Mass. 01748
508-435-2000

Dilog has announced an 8mm tape subsystem designed for use with Digital Equipment Corp.'s Vaxcluster configurations.

The RTA series packages from two to four high-capacity, 8mm cartridge tape drives for direct connection to any single Standard Tape Interface port of a DEC HSC40, 50 or 70 storage controller. The product is capable of supporting any Vaxcluster system without changes to the system or applications software.

Pricing for the RTA series starts at $24,000.

Dilog
1555 S. Sinclair St.
Anaheim, Calif. 92806
714-937-5700

NEW PRODUCTS — SOFTWARE

Utilities

Operations Control Systems, Inc. and Productive Software Systems, Inc. in Eden Prairie, Minn., have announced an agreement to market OCS/Robot data center management software designed for the Hewlett-Packard Co. 3000 environment.

The software maintains a cross-reference database of elements, files and tables used in source code libraries and job control files. It allows users to determine the magnitude of proposed program changes before implementation. Prices begin at $5,950, depending on configuration.

OCS
560 San Antonio Road
Palo Alto, Calif. 94306
415-493-4122

Eden Systems Corp. has released Version 1.3 of A/Auditor (R) PL/I, the company's PL/I quality measurement tool.

The program evaluates the quality of entire libraries of PL/I programs and produces summary reports that follow financial reporting formats.

It allows an organization to create its own standards via a custom exit capability and is site-licensed for IBM MVS mainframes for $30,000. A personal computer version of the product costs $950.

Eden Systems
Suite 201
14950 Greyhound Court
Carmel, Ind. 46032
317-848-9600

A program designed to eliminate storage violations caused by illegal Cobol verb conditions entering a CICS environment is now available from Computer Data Systems, Inc.

Dubbed CICS/RSV, the software runs as a front end to CICS and requires 30 minutes for installation. The initial version supports all IBM MVS/CICS environments and is licensed on a per-CPU basis for $3,000, plus an annual maintenance fee, currently set at $450.

Computer Data Systems
1 Curie Court
Rockville, Md. 20850
301-921-7000

Database management systems

CDB Software, Inc. has announced another version of DB2-Explain, an SQL performance optimizer. The software identifies poorly performing SQL functions. Version 2 evaluates path analysis selections and coordinates link edits with bind routines. A perpetual license is available for $24,000.

CDB Software
P.O. Box 741248
Houston, Texas 77036
800-345-0232

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3. COMPLETE RELATIONAL DATABASE DESIGN FOR DB2 110 PGS.
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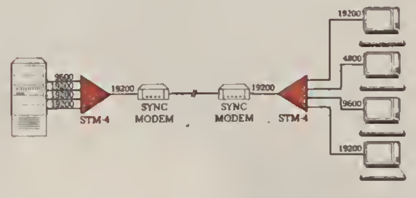

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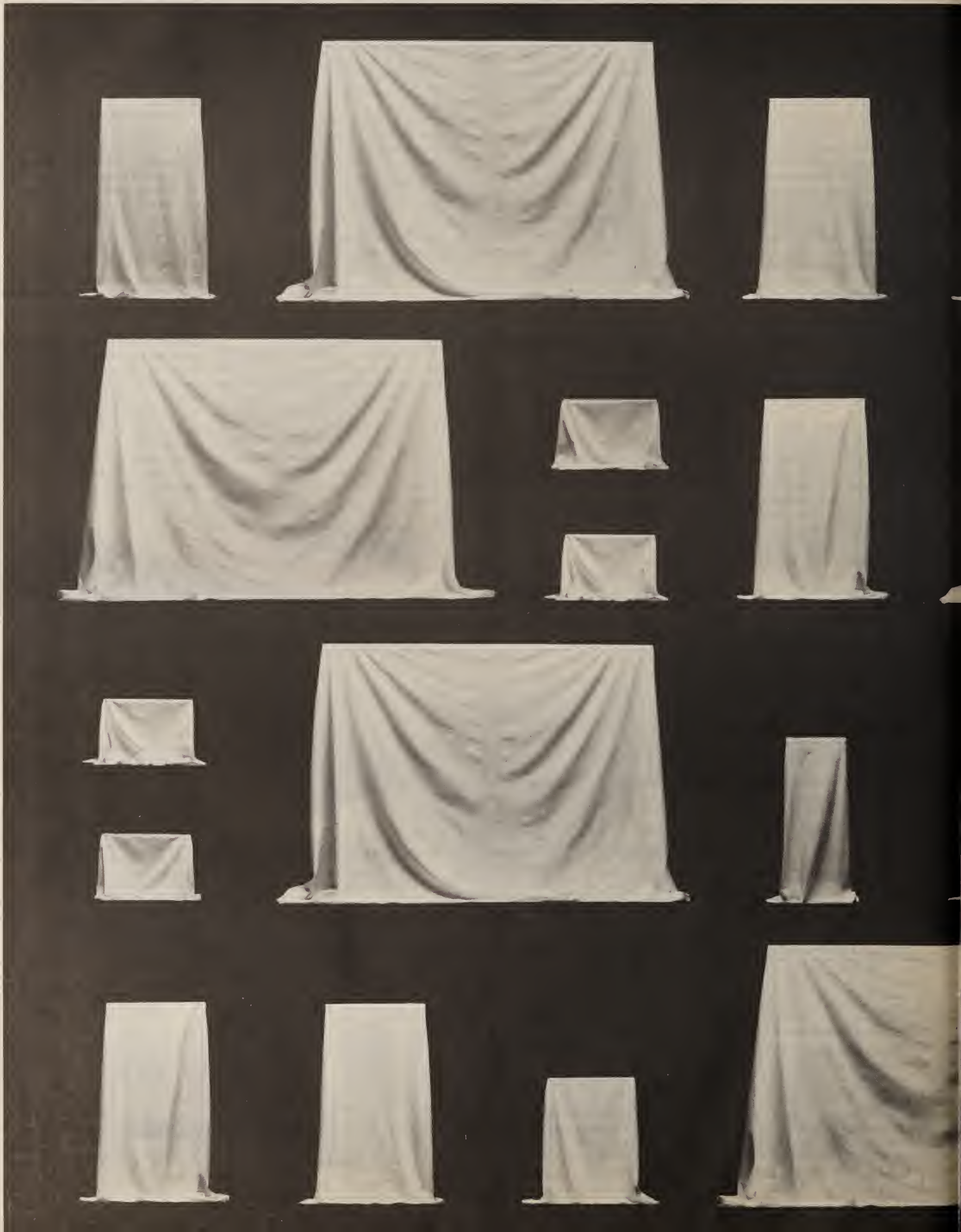

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PCs & WORKSTATIONS

MICRO BITS

Patricia Keefe

A little too extended?

Hit me, beat me, kick me. Never one to shy away from controversy or attempts at standard-making, Microsoft is once again in the soup. First, it was the operating environment wars, launched by Microsoft's refusal to rein in Windows at the expense of OS/2's Presentation Manager. Then, it was the tug-of-war to get IBM's agreement on one view of LAN Manager and OS/2. Now, it's DOS extenders. Microsoft has proposed a new standard and says the issue is technical, not political. But it's both.

Developers concede shortcomings with the existing DOS extender standard, but some are hopping mad over Microsoft's alternative and the fact that Microsoft does not support the current standard. "If we support it, we need to make sure it doesn't change at some individual's whim," added one developer. (Bill Gates, perhaps?) A two-day meeting co-sponsored by Intel and Microsoft last week was designed to collect input on the proposed standard.

"Hell no, we won't go." The League for Programming

Continued on page 50

Users tout 486 portable's pluses

BY RICHARD PASTORE
CW STAFF

Until the day Intel Corp. I486 performance can be shoehorned into a notebook or videocassette form factor, power users will have to pay a steep price and bear a hefty burden for 486 portability. But some users of Dolch Computer Systems' 486 portable say it's worth it.

The $13,000 machine "is a little bit expensive, but the speed and advantages of using it definitely outweigh" it, said Steve Leopold, a software development engineer at Anritsu America, Inc., a telecommunications test equipment maker in Oakland, N.J. "In time savings alone, this will easily pay for itself within six months."

The AC-powered, 20-pound Dolch P.A.C. 486-25 runs at 25 MHz and ships with 2M bytes of random-access memory, expandable to 16M bytes. The 100M-byte hard disk drive is accompanied by a 1.2M-byte, 5¼-in. or 1.44M-byte, 3½-in. floppy disk drive. The electroluminescent screen technology provides pixel resolution of 640 by 400. San Jose, Calif.-based Dolch has been shipping the machines since November.

Anritsu has been developing software with two Dolch 486s for the past couple of months. Because the developers have to recompile their programs frequently, they needed a speedy machine to avoid the time drag.

"On a slower system, you have to wait so long for recompiling, you can get up and walk away from your desk," Leopold said. Leopold runs MS-DOS but plans to eventually switch to Unix.

The firm also required portability, since developers often do work and demonstrations onsite. The weighty machine was a bit daunting at first, Leopold said. "But if you don't take along the manuals and the carrying case, it's not too bad," he said.

"I'm not bothered by the weight," added Kim Beeman, president of Engineering Design in Belmont, Mass. "With 486 power hanging from a shoulder strap, how could I complain?"

Beeman requires the power to crunch a math- and memory-intensive sound analysis application called Signal, which he developed. The portability factor comes in handy when Beeman and his clients take the application to the field — literally. "We go into the field to record animal sounds," he said. "One unit is going to the Arctic this spring."

When it is not in the Arctic, the DOS 3.3-based Dolch box does double duty as Beeman's main desktop machine. "It's the workhorse of the office," he said.

Though they are generally pleased with their units, Beeman and Leopold said they encountered minor problems, including a faulty power supply. Leopold also found that his old modem board would not work in the unit, though a new board worked fine. "I think because of the high bus clock speed, you may have problems with running older-design cards," he said.

Getting into town with some help from Mapinfo

ON SITE

BY SALLY CUSACK
CW STAFF

KANSAS CITY, Mo. — More than 16,000 commuters have hitched a ride to work in Kansas City via a personal computer-based software package.

Bobbie Petesch receives a computer printout about once a month that gives her the names of potential passengers living near her home or along her daily route to work. A participant in the city's Regional Rideshare Program for over two years, she feels the program helps her fill what would otherwise be empty seats in her van.

"I pick up about six people in my van every day. Two of them don't drive at all, and three of them only have one vehicle," she says. "All I did was send in my name, and they sent me a listing of people in my area." Petesch, an engineer at AT&T, receives a printout that is generated by a mapping software package from Mapinfo Corp. in Troy, N.Y. Kansas City uses Mapinfo to maintain the Rideshare program, a free service offered by the Mid-America Regional Council (MARC).

Lenk: *Mapinfo was missing link*

Mapinfo added a missing link to the Rideshare program, said Frank Lenk, assistant community development director for economics and information systems at MARC. Commuters were originally matched using a text-only system on the city's mainframe computer. The lack of a visual, geographic picture was an obstacle to good matches, he said, and many people were sent lists that were virtually useless.

"The printouts often included people that lived too far away and created travel routes with a lot of backtracking involved," Lenk said. "With Mapinfo, the operator can see the actual streets, roads and distances involved when preparing a potential list for car pools."

The Rideshare information resides on an IBM Personal Computer AT-compatible. The Mapinfo package is capable of providing potential matches in

Continued on page 52

Inside

- Microsoft Word opens new windows of performance. Page 49.
- Interface comes through from SCO. Page 52.

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In the beginning was the Word, now a lot more

Microsoft Corp.'s Word for Windows combines the power of the text-based DOS version of Word with the dynamic Word interface available on the Apple Computer, Inc. Macintosh platform.

Word for Windows does virtually everything that falls into the traditional high-powered, office/professional word processing domain. It capably handles large documents, complex formatting, mail merging, fill-in forms, tables, macros, graphics, document conversions and fonts. It also makes use of the Dynamic Data Exchange (DDE) standard for live exchange of data between applications.

Microsoft Word for Windows

Price: $495

- Performance: Very Good - Excellent
- Documentation: Very Good
- Ease of learning: Very Good
- Ease of use: Very Good
- Error handling: Very Good
- Support: Very Good
- Value: Excellent

In addition, it exploits the graphical advantages of Enhanced Graphics Adapter (EGA) and Video Graphics Array (VGA) monitors. The various views of a Word document range from a complete or partial what-you-see-is-what-you-get editable display to a quick-editing draft mode. Placement of text elements, integration of pictures and management of tables take place easily and visually. Multiline formulas with special characters can be entered and displayed as they will appear when printed.

Word for Windows includes a powerful Basic-like macro language that permits advanced users and developers to create and implement complicated Word-related applications.

Word for Windows uses Windows-style editing along with a host of keyboard and menu features. These can be customized to conform to most operating preferences. There is also a useful annotation feature that locks the original document but permits others to annotate or comment on it without changing the basic document.

As with most Windows-based products, Word for Windows handles fonts gracefully. With proper printer setup, the program prints the proper fonts, shows them on-screen as they will appear printed and downloads the required fonts to a Hewlett-Packard Co. Laserjet or similar printer at print time. Fonts can be applied to individual characters, paragraphs or documents, and they can be made part of preset style sheets. Postscript printers are supported as well as a host of additional printers with their built-in or downloaded fonts.

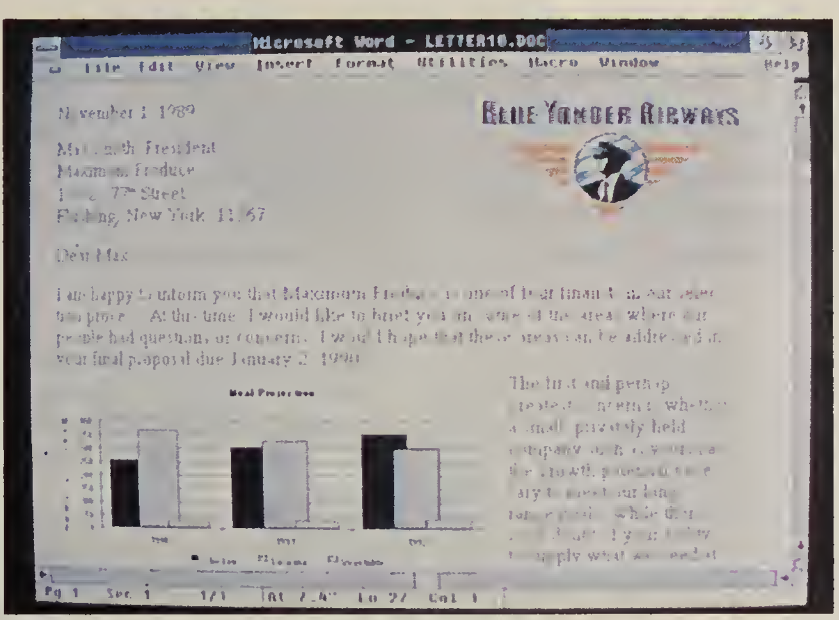
Word for Windows has superior style sheet capability. Templates can be invented with styles of any complexity, including with or without text, and styles can be created by extracting them from existing formatting information or by modifying a pre-existing style.

Word for Windows' spelling checker supports multiple dictionaries and a user dictionary, offers many suggestions for unknown words and maintains capitalization and punctuation. The mail-merge capability sets a standard for excellence.

The program also offers the standard capabilities of a full-featured outliner. It supports up to nine levels and collapses to any level of detail required; styles can be tied to outline levels. All Word for Windows features are available to the outlined text. It can build text from an outline and handle bullets, variable numbering formats and hidden text.

The table of contents and indexing features in Word for Windows produce not only standard tables of contents and indexes but also lists of figures, tables, charts or anything else needing a list. Moreover, the formatting capabilities of the index are top-notch, following the *Chicago Manual of Style* format for multiple entries under the same heading.

Word for Windows will insert graphics derived from any Windows-compatible program and will directly import TIFF files. Word works with DDE-compatible programs to bring in graphics files and fit them to a document.


Microsoft Word - LETTER10.DOC
File Edit View Insert Format Utilities Macro Window Help
Blue Yonder Airways
Pg 1 Sec 1 1/1

Word for Windows: *What you see is what you get*

A fine suite of conversion routines, some automatic, permits Word for Windows to import and export documents into a large range of other word processing programs and file formats.

Word for Windows comes with six manuals, a complete online Help system and a tutorial. The documentation is easy to read, generally complete and nicely indexed. However, the absence of a technical reference manual is a disadvantage.

Reasonable levels of competency for any given mix of daily work will take perhaps a day or two of experience to master. Mastering Word for Windows' more powerful features will take many hours of concerted effort, but it is well worth the time spent.

Word for Windows does a reasonable job of preserving data integrity. While there is no automatic timed backup, a timed backup feature will remind you to save work at any of four intervals. There is a one-level undo, but it covers a comprehensive series of actions such as formatting and sorting.

Word for Windows comes with a 30-day money-back guarantee and a 90-day product usability warranty, which guarantees that the product will meet the specifications in the documentation. In addition, Microsoft operates a regular phone technical assistance line and offers facsimile support. The technicians know the product well.

Given its exceptional capabilities and strong performance, Microsoft Word for Windows has clawed its way to the top of the word processing heap. At $495, it is an excellent value.

Microsoft Corp., One Microsoft Way, Redmond, Wash. 98052 (206) 882-8080.

Windows reflects well on Crosstalk

DCA/Crosstalk Communications' Crosstalk for Windows brings the standard communications tools of Crosstalk XVI and much of the power of Crosstalk Mk.4 to the world of Microsoft Corp's Windows.

An experienced Crosstalk XVI user will recognize the program's familiar style translated into the Windows environment. Windows users will find the familiar pull-down menus, dialog boxes and mouse operation.

Crosstalk XVI's phone directory is there, and it is set up using Windows' dialog boxes. The script language is similar to previous Crosstalk versions but substantially more powerful. Based on Crosstalk Mk.4's powerful CASL, it has extensions for the Windows environment. One script — Intro — runs automatically the first time Crosstalk is started and explains how to configure and use the program. A script can be written using Crosstalk's Learn script, or with any text editor, including Windows Notepad or Windows Write.

Crosstalk for Windows Version 1.0

Price: $195

- Performance: Very Good
- Documentation: Good
- Ease of learning: Very Good
- Ease of use: Excellent
- Error handling: Satisfactory
- Support: Satisfactory - Good
- Value: Very Good

Terminal emulations include Digital Equipment Corp.'s VT102 and VT52, IBM 3101, ANSI color and Compuserve, Inc. Vidtex. There is a choice of several of the most popular file-transfer protocols, including Xmodem, Ymodem, Compuserve B, Kermit, Crosstalk, Dart and the new Zmodem. Information can be cut and pasted between Crosstalk and other Windows applications, or Microsoft's Dynamic Data Exchange can be used for interacting directly with programs such as Excel.

Crosstalk for Windows' performance is smooth and solid. It walks the user through the initial configuration, prompting with dialog boxes for the information

Continued on page 50

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PC Week
June 12, 1989

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January 1990

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More 386 bang for your buck

PC Brand breaks the price/performance rules for 33-MHz systems

PC Brand, Inc.'s 386/33 System provides typical 33-MHz performance at a price that hasn't been beaten yet. The 33-MHz Intel Corp. 80386-based computer costs just $4,963 including 4M bytes of random-access memory, a 150M-byte hard drive, a Video Graphics Array (VGA) board, a single floppy disk drive and four ports. It also includes a VGA monitor.

The system is a strong performer, displaying better-than-average speed in both memory-intensive and disk-intensive work.

In software and hardware compatibility, PC Brand is flawless. It lacks only its own version of OS/2.

> IT IS A STRONG performer, displaying better than average speed in both memory-intensive and disk intensive work. In software and hardware compatibility, PC Brand is flawless; it lacks only its own version of OS/2.

PC Brand's desktop case (a tower case is also available) is nicely expandable. It offers eight slots — one for a 32-bit memory card, along with five 16-bit slots and two 8-bit slots. There are five 5¼-inch half-height drive bays.

Setting up this system is easy. The 150M-byte hard disk drive comes in five partitions of 30M bytes each. The card guides are well-made. The front of the system contains a reset button and a turbo switch. The system board contains one DIP switch block between the innermost bus slot and the power supply, and there is enough room to place a whole hand into this area for better line of sight and control when changing the switches. The system has a read-only memory-based setup.

The Micronics Computer, Inc. main board is very clean, partially due to the fact that there is no RAM on the motherboard; it is all located on a memory board in the 32-bit slot. One problem is the difficulty of removing the housing, due to the power switch on the side of the case. This could cause some confusion for novice users, since when all screws have been removed from the back of the system they still cannot remove the housing.

The wire-bound documentation that accompanies the system is complete, and PC Brand offers a unique warranty: The first year is the typical parts and labor coverage, while the next four years cover only parts in decreasing percentages, from 80% in the first year to 20% in the fourth year.

The company also offers one year of on-site service, a 30-day money-back guarantee and a toll-free support line. PC Brand's support hours are scheduled from 8:30 a.m. to 4:30 p.m. Central time.

PC Brand's combination of fine performance and the lowest price in its class makes it an excellent value.

PC Brand 386/33 System

Price: $4,963

- Performance: Very good to excellent
- Documentation: Satisfactory
- Setup: Good
- Support: Satisfactory to excellent
- Value: Excellent

Keefe

FROM PAGE 47

Freedom, the people who picketed Lotus' Cambridge, Mass., headquarters last May to protest its stance on copyrighting software, is alive and kicking.

The group has about 35 members, according to league President Richard Stallman, who developed Emacs, a widely used and copied programming editor.

The purpose of the group is to "fight against the imposition of monopolies against classes of programs," which Stallman claims threatens the freedom to write programs as developers see fit. The group is open to new members and can be reached at 1 Kendall Square #143, P.O. Box 9171, Cambridge, Mass. 02139.

Gee, what could it be? Lotus says it will take the wraps off an upgrade to 1-2-3 next week. Coincidently, the word on the street is that 1-2-3/G, the graphical OS/2 version of the Lotus spreadsheet, is due out any day now.

Judging from recent comments from beta-test site users and Lotus President Jim Manzi's demonstration at the Boston Computer Society, it's more than ready to roll. However, some sources say Lotus may be held up by delays in the availability of OS/2 2.0.

Still, users are enthusiastic. "We really think it's impressive. To have the tools you're used to under DOS available under OS/2 gives you new capabilities while allowing you to preserve training under the DOS version," said a beta tester at a financial services company.

Send in the clones, please. 1-2-3 for Sun isn't just for Sun workstations. Lotus is hoping Sun's Scalable Processor Architecture (Sparc) cloners will also embrace the product. According to Lotus Vice-President Frank Moss, Lotus is currently testing the software on some Sparc clones. When asked how Sun felt about that, Moss said, "They think it's great!"

> LOTUS *does* do Windows. Not that anyone will be surprised, but a frank President Manzi recently confirmed that his company is working on a Windows version of 1-2-3. No delivery date was supplied.

Get out the Windex. Lotus *does* do Windows. Not that anyone will be surprised, but a frank President Manzi recently confirmed that his company is working on a Windows version of 1-2-3. No delivery date was supplied. Meanwhile, the spreadsheet maker reportedly has 30 people assigned to its project for the Next, Inc. machine, which is said to be slated for a September arrival.

However, OS/2 remains king for Lotus. Manzi let it slip that Lotus has sunk $40 million into OS/2 applications development.

He also said 1-2-3/G, most likely the next port to hit the shelves, will be compatible with LEAF, now called the Lotus Add-in Toolkit for Release 3.0, enabling applications developers to create tightly integrated enhancements to Release 3.0.

How tedious was it? At one point last week in the Lotus copyright infringement trial in Boston, after hours of technical testimony — which was displayed across nine monitors including three huge screens — U.S. District Judge Robert Keeton stopped the proceedings to give the stenographer a rest.

Two days later, no sooner had Keeton cleared the monitors from the courtroom, then he was forced to contend with graph-by-graph objections to pages of testimony from one Lotus witness. (The first round of testimony was covered in written affidavits in order to save time.)

When Paperback Software's attorneys showed signs of similarly dissecting written testimony from Lotus founder Mitch Kapor, Keeton put his foot down and persuaded Paperback to waive some of its lengthy objections.

Keefe is *Computerworld's* senior editor, PCs and workstations.

Crosstalk

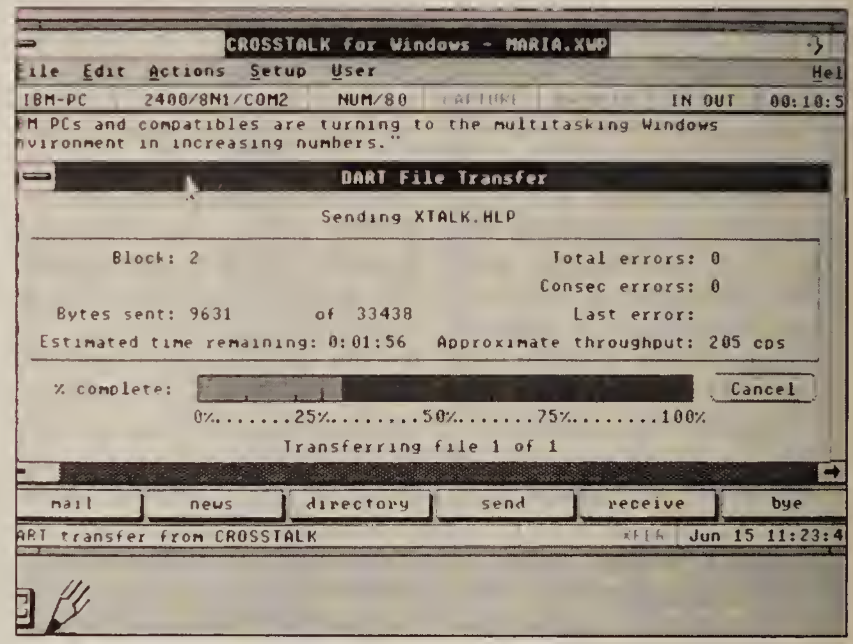
FROM PAGE 49

it needs. The Crosstalk for Windows main screen is a typical Windows display, with the menu bar across the top of the screen and an information line across the bottom.

The display can fill the entire screen or, like most Windows applications, can be resized and moved around.

The dialing directory holds all the information Crosstalk needs to communicate with each remote system, including phone number, data parameters, password, user ID and script to run. New entries are easy to create.

Crosstalk for Windows lists the phone entries that are selected by pointing and shooting with the cursor. Crosstalk loads the selected entry, sets all the system parameters specified during setup and offers to make the call.



```
IBM-PC      2400/8N1/COM2      NUM/80                    IN OUT   00:10:5
M PCs and compatibles are turning to the multitasking Windows
vironment in increasing numbers."
                          Sending XTALK.HLP
        Block: 2                                   Total errors: 0
                                                  Consec errors: 0
   Bytes sent: 9631        of  33438                 Last error:
  Estimated time remaining: 0:01:56   Approximate throughput: 205 cps
   % complete:
               0%.......25%........50%.......75%........100%
                       Transferring file 1 of 1
ART transfer from CROSSTALK                           Jun 15 11:23:4
```

Crosstalk for *Microsoft Windows combines the features of Crosstalk XVI with the ease of point-and-shoot menus*

Learn produces an ASCII script that can be edited with Notepad, Windows Write or any other ASCII-capable editor. Crosstalk compiles its scripts for increased speed. During compilation, Crosstalk identifies and reports any script errors that it finds.

Screen data can be captured to a file by clicking the capture button on the screen or selecting "Capture" on the File submenu. It can also be marked with the cursor and pasted to Windows' Clipboard, using normal Windows procedures.

Crosstalk for Windows comes with a user's guide and a programmer's reference. Each is logically organized, well-written and has a complete, accurate table of contents and index. Indexed help is available whenever the control menu is active. Even relative novices should be up and running pretty shortly with this product, and it is very easy to use.

Error of its ways

Error handling is typical for a first-release program of this complexity. The most serious oversight is Crosstalk for Windows' willingness to overwrite existing files without warning.

Registered owners of Crosstalk Mk.4 and XVI can upgrade to Crosstalk for Windows for $95. DCA/Crosstalk Communications provides two bulletin board systems, a Compuserve forum and free technical support via telephone (not toll-free) from 9 a.m. to 6 p.m. Eastern Standard Time.

Crosstalk for Windows' $195 price tag puts it in the midpriced range for a communications package, costing the same as Crosstalk XVI but with considerably more to offer. Dedicated Windows users will find it a treat to be able to use those handy Windows features during communications sessions.

Crosstalk for Windows requires the full working version of Microsoft Windows/286 or Windows/386, not just a runtime module, and many of its special features directly support Windows functions.

DCA/Crosstalk Communications, 1000 Holcomb Woods Pkwy., Roswell, Ga. 30076-2575.

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SCO delivers on interface

Open Desktop gives Unix early edge in MS-DOS succession

BY CHARLES VON SIMSON
CW STAFF

SANTA CRUZ, Calif. — The running battle between OS/2 and Unix to be the anointed heir to MS-DOS took a measure of shape recently when The Santa Cruz Operation (SCO) began delivery of its Open Desktop graphical Unix operating system.

"On the [Intel Corp.] 386 platform, SCO is clearly the leader," said Paul Cubbage, a Unix analyst at Dataquest, Inc. in San Jose, Calif. "But you are just on the early edge of either operating system for most [user] companies. Only those with an immediate need are making any move at all" away from DOS.

Early SCO customers are not recent converts to Unix. They typically have a long history of Unix installations either for sales into the federal government or sophisticated technical analysis.

Open Desktop incorporates an AT&T Unix System V engine with an interface based on the Open Software Foundation's Motif as well as a number of network services and DOS integration into a shrink-wrapped package for Intel 80386 and I486 machines.

The SCO interface closely parallels the look and feel of Microsoft Corp.'s Windows and is widely seen as an important boost to the proliferation of Unix on the desktop.

Where it's happenin'

"In the federal government, the Unix office automation market is booming," Cubbage said. "Anyone who wants to sell there has to be right on top of it."

Among the early users is Eastman Christian Corp., an oil-field service company that will use Open Desktop on 70 laptop 386 computers from Grid Systems Corp. The system will be used to do highly sophisticated statistical analysis of well-drilling on off-shore oil rigs.

Eastman Christian technicians will use the graphical component of Open Desktop to render real-time graphical depictions of well bores and employ a relational database to store drilling parameters for both dynamic and static anlysis.

While Eastman Christian is not a new user of Unix, the shrink-wrapped collection of capabilities was attractive. "We could have developed our own system by linking an engine, a relational database, a [Transmission Control Protocol/Internet Protocol] network and an X Window environment," said Larry Flournoy, the company's director of technical software. "This was an easier solution."

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These two programs have become the standards for many large corporations. And now you can find out why. Take advantage of these special offers today. Because this deal only lasts until May 31, 1990. But you could reap the rewards for a long time to come.

Lotus BANYAN

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Mapinfo

CONTINUED FROM PAGE 47

order, starting with candidates clustered within the closest proximity and working outward. It runs in conjunction with the Foxbase relational database management program from Fox Software, Inc. to maintain client records, geocode matching and other rider information.

There are currently about 2,000 names in the active file, according to Lenk.

"When people call, they are placed in the system, matched and sent a letter giving them a list of names. After five months, another letter is sent out to ask if they want to remain in the system. If not, they are placed in the inactive file," he said.

Lenk and his staff developed a writing scheme that provides several additional functions. These include criteria based on distance to work, distance to home and individual work schedules.

The program also keeps track of people who prefer to be drivers as well as those who would rather ride. Street address information is updated every six months via information that is sent by the city.

Increased efficiency

With Mapinfo, MARC is able to generate as many as 70 Rideshare matches a day, with only one data entry operator, as opposed to 20 or 30 with the text-based system. Lenk also sees the software package as more cost-effective than the previous method, which involved leased lines to the city's IBM 370-type mainframe at a cost of approximately $1,000 per month. He said he estimates the entire Mapinfo installation process, including programmer costs, data conversion, debugging and testing, to have cost about $15,000.

Mapinfo 4.0 runs on IBM Personal Computers, XTs, ATs and compatibles with 640K bytes of memory. The package allows users to manipulate locations identified by street address, ZIP code, city, state, county, census tract or any other geographic information. It operates in conjunction with data in the user's existing database or with data in any ASCII text file.

Users may customize the software using a mouse, keyboard or digitizer. The package, which comes standard with a U.S. map, a world map and complete ZIP code information, is priced at $750, according to the company.

Additional user nodes may be added at $595 each, the firm said.

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A few words about the great debate between Sybase and Oracle.

relational database blah blah blah blah benchmark scores like you wouldn't believe blah blah blah blah everybody's information management needs from you down to the janitor blah blah blah blah blah blah blah blah blah thousands of consultants 24 hours a day for the rest of your life blah blah blah blah blah blah blah blah blah technical gibberish blah blah blah blah blah blah vaporous promises blah blah blah blah blah custom tailored to fit everybody blah blah blah blah blah blah blah relational database blah blah blah the computing environment that redefines the 21st century blah blah blah blah blah blah post-state-of-the-art blah blah blah blah blah nanosecond response times blah blah blah blah blah runs on every platform in the known universe blah blah blah blah blah all's fair as long as you're not outright lying blah blah blah blah blah

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Ashton-Tate releases SQL Framework front end

BY CHARLES VON SIMSON
CW STAFF

TORRANCE, Calif. — In one of several announcements, Ashton-Tate Corp. last week unveiled an SQL Server front end to its Framework III product. The enhancement is seen more as preparation by Ashton-Tate for the introduction of Dbase IV Version 1.1 than as a significant piece of new technology.

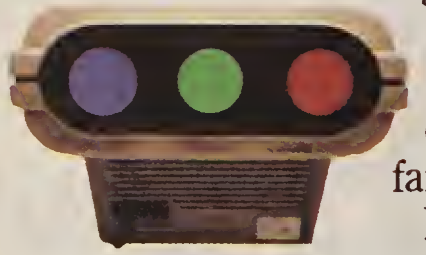
The company announced the immediate availability of an SQL link for Framework III, its decision support package that includes spreadsheet, word processing and database technology. The new product is a relatively simple set of code that will allow users to bring data from Microsoft Corp.'s SQL Server into the Framework product using SQL queries.

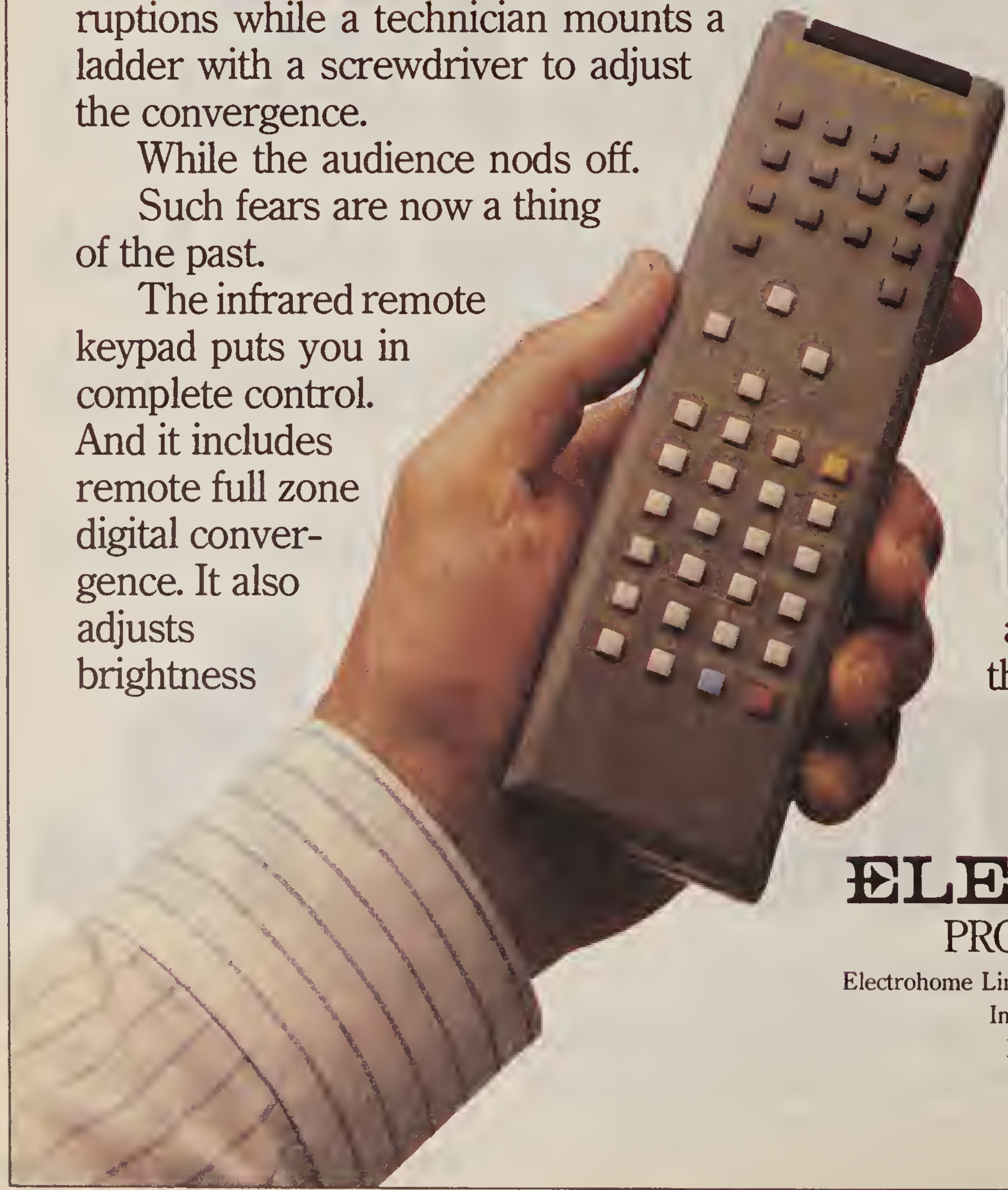
"At this point, Ashton-Tate is concerned about getting edged out of the market for SQL products completely," said Bruce Lupatkin, a software analyst at Hambrecht & Quist, Inc. in San Francisco. "This product will at least give them a presence going into the Dbase IV announcement."

The product is yet another in a tide of minor announcements the company has made in recent months covering everything from reseller surveys to enhanced telephone service to niche enhancement products, an ongoing stream that is seen as being as much to boost internal morale as to communicate to the marketplace.

"They are greasing some rusty marketing gears in making all these announcements, and there is nothing better for morale than shipping a product, even if it is a minor product," said Bahar Gidwani, an independent software analyst based in New York. "But in terms of real technology, I have not seen anything significant in months."

The company also announced the immediate availability of Dbase Direct for the IBM AS/400 and 3270 systems. The products will enable Dbase III Plus PC users to access data resident on IBM midrange and mainframe systems. Prices will be between $2,495 for the AS/400 9404 system and $4,995 for the 9406 system; the 3270 product is $595 for a PC-based license. Ashton-Tate already offers Dbase Direct for IBM System/36 and System/38 products.





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NEW PRODUCTS

Software applications packages

Corel Systems Corp. has enhanced its illustration desktop publishing software with a Microsoft Corp. Windows-based utility typeface conversion function. This allows graphic artists in an IBM Personal Computer environment to access typeface outlines from a variety of digital-type manufacturers, the firm said.

Corel Draw Version 1.1 also offers eight additional font formats and a clip-art library with as many as 300 images.

The package is priced at $595. Current users may upgrade for $100.

Corel Systems
Suite 190
1600 Carling Ave.
Ottawa, Ont., Canada K12 7M4
613-728-8200

A statistical graphing package for IBM Personal Computers and compatible machines has been released by Knowware.

Called Stats, the program allows users to input current data from any number of graphs onto a single screen via a numeric keypad. Graphs may be automatically created using different time periods, such as bi-weekly or quarterly frames, and unit of measure conversion is also provided.

The software costs $575.

Knowware
P.O. Box 17788
Boulder, Colo. 80308
303-444-7224

A document proofreader created for use with the Tandy Corp. Deskmate interface is now available from Rightsoft, Inc.

Rightwriter for Deskmate parses sentences to analyze business and technical writing and is capable of highlighting wordy or redundant phrases and weak sentences. The program also locates slang, incomplete sentences and jargon.

It is priced at $79.95.

Rightsoft
4545 Samuel St.
Sarasota, Fla. 34233
813-923-1233

A software package designed specifically for Wordperfect Corp. Wordperfect users working in law offices has been announced by Legalsoft Corp.

Called Case Perfect, the program runs on IBM Personal Computers and compatibles and enables a law firm to create a custom legal management system using existing information and documentation. This provides automatic tracking of client and case information, the vendor said.

A single-user version is priced at $249, and a hard disk drive is required for operation.

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NETWORKING

DATA STREAM

Joanie M. Wexler

Buyers pay for FCC delay

With all the brouhaha that erupts whenever AT&T inks a custom network deal, maybe the Federal Communications Commission should just disallow all carriers' custom networks until it makes up its mind whether AT&T should be further deregulated.

After all, you'd hardly know that twice during the last year, the FCC has upheld the legality of AT&T's Tariff 12, under which the carrier bundles network services and related equipment in order to woo business customers with significant discounts. Each time the carrier signs a new contract, its competitors — most notably MCI Communications Corp. and U.S. Sprint Communications Co., who offer their own custom networks — grab furiously onto the FCC's apron strings, stamp their feet and whine that the deal "isn't fair."

This is because they are opposed to AT&T — still considered a "dominant" carrier — being allowed to offer custom networks at all. So they challenge each contract and delay implementation of the Tariff 12 networks.

Continued on page 61

Entertaining the idea of SQL-based systems

BY ELISABETH HORWITT
CW STAFF

GUILFORD, Conn. — A small software and systems integration firm could put symphonies, theaters and sports arenas on the leading edge of the SQL-based client/server revolution, even while Fortune 500 companies are still weighing the pros and cons of such platforms.

The technology has allowed users such as Seattle Symphony to personalize their ticketing and fund-raising efforts to a degree never possible before, according to the symphony's systems director, Deborah Braun.

The symphony is a beta-test site user of Artsoft/SQL, a turnkey business management system that was recently introduced for the entertainment industry by Hill Art & Entertainment Systems, based in Guilford, Conn. Hill A&E also introduced Sportsoft/SQL, a sports facility version of the product.

The two offerings are said to provide an integrated set of business management applications, including marketing, ticketing, accounting, fund-raising and box office management, based on Sybase, Inc.'s SQL-based relational database management system. The offerings will run on the wide range of computer and local-area network platforms supported by Sybase, Hill A&E said.

The new offerings will succeed Artsoft, Hill A&E's existing Microsoft Corp. MS-DOS product, which typically runs on Novell, Inc.'s Netware.

Seattle Symphony is currently testing Artsoft/SQL and hopes to completely migrate to the system by July, according to Braun.

Rich Frishman

Seattle Symphony's Braun *is testing Artsoft/SQL*

"The biggest overall improvement is that the new system revolves around the patron as a person," Braun said. "We really like some of the ticketing features." For example, a three-dimensional seating chart allows

Continued on page 60

E-mail directories: One step at a time

ANALYSIS

BY ELLIS BOOKER
CW STAFF

Suppose you can call anyone, anywhere in the world . . . but the only telephone numbers you have are those scrawled in the margins of your high school yearbook.

By analogy, the spate of X.400 electronic mail interconnections and gateways over the past year have at last given E-mail users the ability to send messages across different vendors' systems. What they lack is a convenient way to address their correspondence.

Directory services, now unique and separate, must be standardized and then coupled to make E-mail a ubiquitous tool. This is the task of the X.400 companion protocol — X.500.

In a watershed event last month, Western Union Corp. hosted a meeting to propose a consortium to speed development and implementation of directory services based on the X.500 standard. The meeting attracted representatives from AT&T, Sprint International, BT Tymnet, Inc., General Electric Information Services, MCI Communications Corp., Pacific Bell, IBM Information Network and others.

Unless service providers figure out how to accommodate X.500, "we'll find ourselves on the threshold of a service with a lot of unanswered questions," said Donald Casey, director of external affairs for Western Union's Business Services unit and X.400 product manager.

The 10-member consortium is planning a meeting in April to

Continued on page 60

Inside

- Comnet '90 offers remote network management tools. Page 60.
- NCR Comten unveils net integration arm. Page 60.
- Telematics' T1 switch taps frame relay. Page 61.

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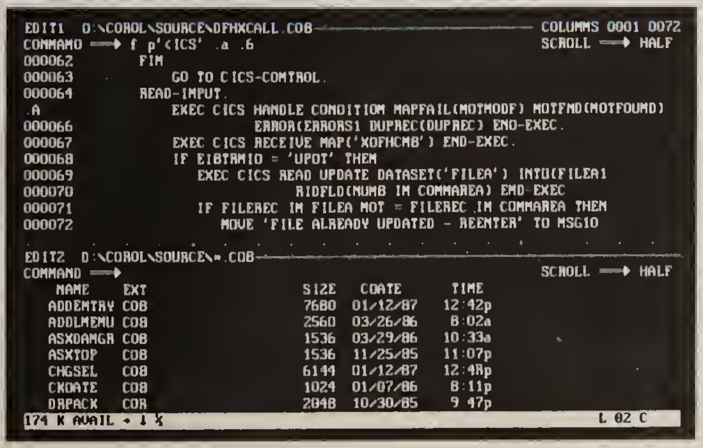

```
EDIT1   D:\COBOL\SOURCE\DFHXCALL.COB-------------------------- COLUMNS 0001 0072
COMMAND ---> f p'<ICS' .a .6                                   SCROLL ---> HALF
000062         FIN
000063             GO TO CICS-CONTROL.
000064         READ-INPUT.
.A                 EXEC CICS HANDLE CONDITION MAPFAIL(NOTMODF) NOTFND(NOTFOUND)
000066                        ERROR(ERRORS1 DUPREC(DUPREC) END-EXEC.
000067             EXEC CICS RECEIVE MAP('XOFHCMB') END-EXEC.
000068             IF EIBTRMID = 'UPDT' THEN
000069                EXEC CICS READ UPDATE DATASET('FILEA') INTO(FILEA1
000070                            RIDFLD(NUMB IN COMMAREA) END-EXEC
000071                IF FILEREC IN FILEA NOT = FILEREC IN COMMAREA THEN
000072                   MOVE 'FILE ALREADY UPDATED - REENTER' TO MSG10

EDIT2   D:\COBOL\SOURCE\*.COB--------------------------------------------------
COMMAND --->                                                   SCROLL ---> HALF
    NAME     EXT                          SIZE   CDATE      TIME
   ADDENTRY COB                          7680  01/12/87   12:42p
   ADDLMENU COB                          2560  03/26/86    8:02a
   ASXDAMGR COB                          1536  03/29/86   10:33a
   ASXTOP   COB                          1536  11/25/85   11:07p
   CHGSEL   COB                          6144  01/12/87   12:48p
   CKDATE   COB                          1024  01/07/86    8:11p
   DRPACK   COB                          2048  10/30/85    9 47p
174 K AVAIL - 1 %                                                  L 02 C
```

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your group

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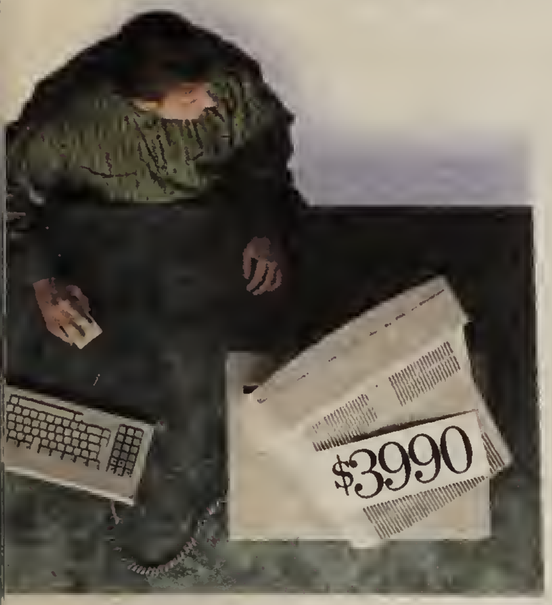

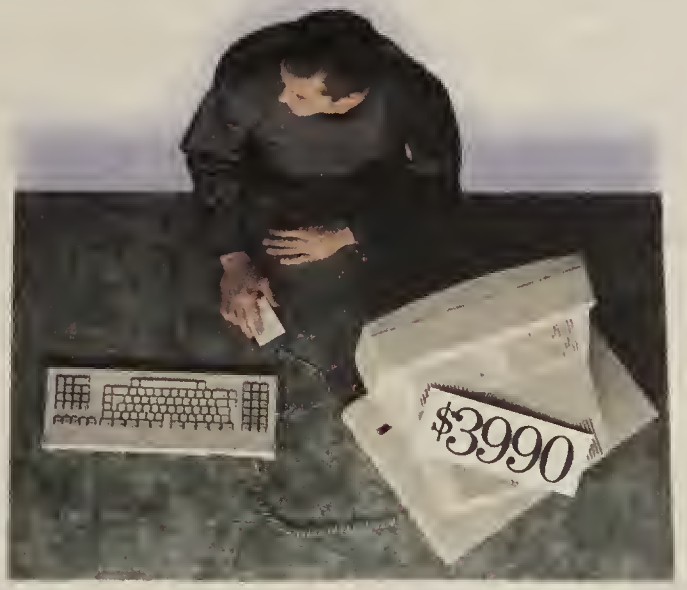

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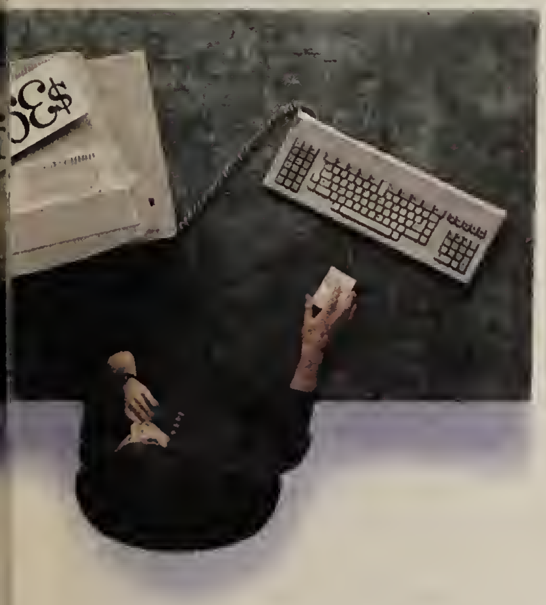

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E-mail

FROM PAGE 57

hammer out various issues not addressed in the CCITT's 1988 X.500 standard. One important business issue is how value-added network providers can offer some form of common directory without divulging sensitive information about their customer base to competitors.

However, the group, which is not prepared to say when it will begin an X.500 trial, will address mechanisms for accounting. "Like any first-round CCITT standard, a few technical issues haven't been fully addressed," said Rich Miller, president of Rapport Communications, Inc., the Palo Alto, Calif.-based consultancy that helped Western Union prepare for the January conference.

X.500 specifies how messaging information is exchanged among distributed value-added network databases, but it does not specify the type of information that should be shared. The consortium hopes to make progress on the latter point.

Miller said the biggest technical capability missing from the current X.500 protocol is how various, distributed directories "shadow" one another — that is, how a master copy propagates portions of its database in other messaging systems to ensure consistent, updated addresses throughout. Although X.500 can be implemented without such a propagation process, the cost of maintaining distributed directories could make some applications prohibitively expensive.

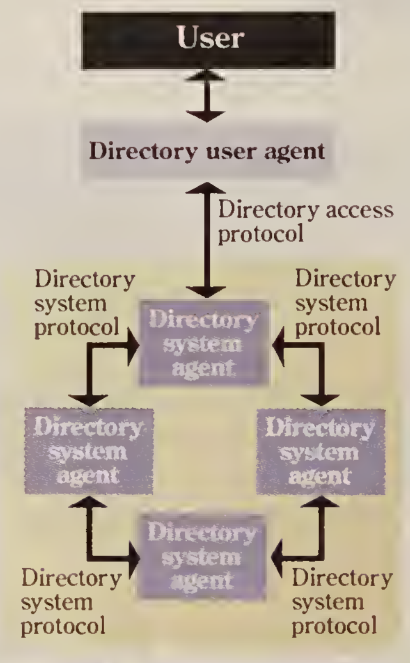
The goal for messaging providers and users alike is that an X.500 transaction will be relatively transparent to the user while maintaining the sanctity of each database.

In operation, the X.500 transaction could look like this: A user in one domain — which can be either an "administrative" one operated by a value-added network provider, such as Western Union or MCI, or a private one on a local-area network — will search for a user name, starting on the local system's database. If the intended recipient is not found, the user might be allowed to specify attributes, such as company name or country, for a search into other domains.

Hammering out the parameters for a "reasonable search" into other domains is another objective for the consortium, Casey said. "I don't think anyone would want to create a system that endlessly searched the globe for a user name," he said.

Opening doors

Under the X.500 directory model, electronic mail users find easier access to more mail recipients


User
Directory user agent
Directory access protocol
Directory system protocol
Directory system agent
Directory system agent
Directory system agent
Directory system agent
Directory system protocol
Directory system protocol
Directory system protocol

Source: Rapport Communications, Inc.
CW Chart: John York

LAN management tools find audience

Networking vendors unwrap an assortment of products at Comnet

BY ELISABETH HORWITT
CW STAFF

WASHINGTON, D.C. — Several announcements made at the recent Communication Networks '90 conference addressed a burgeoning demand for tools that would allow network managers to monitor, troubleshoot and analyze traffic patterns on remote local-area networks from a central location.

"What we really need is a more vigorous LAN management and control product than what we've seen, [which would] let you know what's going on," said Howard Anderson, managing director of Boston-based consulting firm The Yankee Group.

Even if each LAN had its own local management system, network managers should be able to view a corporatewide system of LANs "almost globally" and have access to information and pinpoint problems such as "performance has degraded like crazy in Philadelphia, and whoops, Joe Smith is sending a batch [file]," Anderson said. The manager should also have the ability to control access and resource utilization on those remote LANs — for example, cut off the erring user's transmission, Anderson added.

One Comnet introduction that promised to at least partially satisfy these demands was Network General Corp.'s announcement of ongoing monitoring and reporting capabilities for its Sniffer family of LAN diagnostic products.

Instead of "waiting for something to fail and having 20 users screaming," the Sniffer user can now receive "proactive" notification when a network component fails or a predefined traffic or error threshold is reached, according to Network General director of marketing Jay Weil.

According to Weil, the enhanced system can also collect statistics on network activity to disk and generate reports via predefined templates. Reports can summarize activity on a particular station or server as well as traffic that is specific to a particular network protocol, such as Transmission Control Protocol/Internet Protocol, he added.

The enhancements are now standard with Sniffer products and are available as a free upgrade to users who have warranties.

More at Comnet

Other Comnet announcements included the following:

- Spider Systems, Inc. in Burlington, Mass., announced a CCITT 802.5 token-ring version of its Spider Analyzer, which is said to allow the user to diagnose LAN protocols, traffic and error levels and also provide LAN monitoring, error messages and diagnostics, as well as ongoing monitoring of LAN traffic and error levels.
- Vance Systems, Inc. in Chantilly, Va., announced that its ATS LAN Analysis System will pass alarms to two centralized network management platforms: Avant-Garde, Inc.'s Net/Command and AT&T's Unified Network Management Architecture.

LAN Analysis is said to monitor traffic and error activity on 802.5 token-ring, 802.3 Ethernet and 802.4 token bus LANs.

- Avant-Garde announced a system for gathering alarms and alerts from a variety of LAN diagnostic systems, including those from Network General, Vance and Spider. The Boole & Babbage, Inc. subsidiary also introduced a graphic presentation map for overall network viewing with the ability to zoom down to the port level.
- Cisco Systems, Inc. in Menlo Park, Calif., announced Netcentral, a network management system that is said to manage any LAN or other network system that supports the Simple Network Management Protocol. A topology map is said to keep track of SNMP network status and zoom down to the port level.

The system is also said to incorporate a Sybase, Inc. SQL database for collecting historical information on network performance and traffic patterns for later analysis. Priced at $14,000, it is scheduled to be available in the second quarter.

- Synoptics Communications, Inc. in Mountain View, Calif., announced Lattisnet Netmap, an IBM Netview/PC application, which is said to allow Lattisnet Network Management Release 2.1 to send CCITT 802.3 Ethernet LAN alerts and alarms up to IBM's Netview.

In addition to reporting alerts, threshold data and specific LAN configuration information to Netview, Netmap is said to allow Netview users to send configuration commands down to the Lattisnet system. Netmap is available immediately, priced at $4,495.

SQL

FROM PAGE 57

box office telephone operators to check seating availability for not just one, but a whole series of concerts at one time.

Another plus from the new system is the ability to find the best available seat "with the touch of a button instead of having to hunt around the charts," Braun said.

The difference between the new and old software's user interface is "like night and day," stated Leon Scioscia, general manager at the Herberger Theater Center in Phoenix. The theater was an early user of the original Artsoft product and is a current beta-test site for Artsoft/SQL.

"The old system works, but it can't do two different functions at the same time," Scioscia said. In contrast, the new system's windowed environment allows the user to "add, change or delete information on a patron's record, or days and dates for performances, at any time, without having to back out of the menu to select change mode," he added.

Artsoft/SQL also provides a facility for developing scripts to guide inexperienced box office personnel through a particular procedure. This training aid is vital because "box office tellers aren't usually the kind of people who stay around a long, long time; we do have turnover," Scioscia said.

Both Scioscia and Braun were particularly pleased with Artsoft/SQL's flexible reporting capabilities, which enable users to cross-reference subscribers according to a virtually unlimited number of variables. This is a tremendous boon to the symphony's marketing and fund-raising staffs, who are "always looking for a new base of people to hit" with targeted mailings, Braun said.

Artsoft/SQL "allows us to go into our database and say, for example, 'Find all the people who came last year and saw three musical presentations,'" Scioscia said. It would then take only a few keystrokes to compile a list of such subscribers, sort it by address and merge it with a letter inviting the people to subscribe to a special, musicals-only package, Scioscia said.

"On the current system you have to do three separate selects and then almost manually merge them to get Zip Code order," he said.

Users also praised Artsoft/SQL's real-time database updating, a crucial feature when a dozen or 50 box office operators are simultaneously assigning seats for the same productions. The original Artsoft program also provided this capability, but it required some fairly fancy enhancements to the MS-DOS-based system, A&E said.

"To my knowledge, we have not assigned the same seat to two people yet," Braun reported.

Service to aid integration

BY SALLY CUSACK
CW STAFF

Claiming to provide cost-effectiveness for customers, NCR Comten recently created Network Integration Services, designed to operate as a separate entity within its marketing group.

The service will aid users in LAN-to-WAN integration and assist in integrating standards-based networking technology into Systems Network Architecture (SNA), the company said.

According to Edward J. Clark, vice-president of marketing, it just "doesn't make good dollar-sense for clients to keep technicians on the payroll for integration purposes."

Network Integration Services will accommodate customers who want Open Systems Interconnect and SNA in the same environment and "will open SNA up to anyone who wants to play," Clark said. The service's central support function is based in St. Paul, Minn., and encompasses between 350 to 400 full- and part-time personnel, including the entire NCR Comten technical staff.

Functions grouped under the Network Integration Services umbrella reportedly include network design and integration; project management functions for budgeting, negotiating and managing third-party suppliers; network consulting for developing requests for proposal information, price quotations and network problem analysis and isolation; and hardware and software development services.

Targeted at both end users and established systems integrators, Network Integration Services is available worldwide, with pricing dependent on the type of services provided.

Wexler

CONTINUED FROM PAGE 57

The stall tactics of AT&T's competitors succeed on a certain mudslinging level. First of all, they make signing on for a custom network with AT&T appear risky, because many customers can't afford to sit out for the duration of an FCC investigation — which can take up to 15 months — to get their AT&T networks installed.

Because of this, the complainant occasionally drums up business when a customer defaults to its competing custom network. Georgia-Pacific in Atlanta is one organization that switched from AT&T to MCI because of the lengthy regulatory delays in getting its contract approved.

Finally, the drawn-out tariff disputes cost the AT&T customer big bucks in network operating costs. For example, one Tariff 12 customer, Paine Webber, a New York-based brokerage company, claims to have lost "several hundreds of thousands of dollars" while waiting to get its tariff approved because of regulatory interference by MCI and U.S. Sprint, both of which bid against AT&T for the contract.

Robert Benmosche, an executive vice-president at Paine Webber, indicates that he felt the challenge by MCI and U.S. Sprint was prompted more by sour grapes than by suspicion of unlawful provisions in the contract.

"We should not have had to pay the penalty for [MCI and U.S. Sprint] losing a fair competitive bid," Benmosche says.

AT&T is taking strides to reduce risk to some of its customers. The company recently filed an insurance plan with the FCC to protect a potential Tariff 15 customer in the event of a regulatory delay. Under the Tariff Assurance Plan, the carrier would reportedly make payments to the customer in the form of service credits, which would make up the difference in rates paid for network services during the suspended period and the Tariff 15 rates.

The usual suspects are opposing that action, claiming that it violates the Communications Act of 1934, which prohibits carrier discounts through rebating portions of tariffed rates to selected customers. Moreover, the FCC recently rejected a similar AT&T rebate offer to a potential Tariff 16 customer, the University of Texas. Tariff 16 provides for custom network discounts to universities and government bodies.

Personally, I don't know whether AT&T is trying to get away with anything in these contracts or not. And no carrier should be allowed to ignore FCC regulations and gain an unfair advantage.

However, while AT&T isn't hurting for overall market share, it seems that what we have in the long-distance market is not so much regulation of AT&T for the competitive good as reverse discrimination of the carrier.

The result is an ongoing shoot-out match that ultimately winds up injuring the customer.

AT&T's competitors can probably inch business away from the company for a while longer using their regulatory crutch, but sooner or later, they are going to have figure out how to win market share on their own merits.

Wexler is a *Computerworld* senior writer.

A second contender in frame relay technology

BY SALLY CUSACK
CW STAFF

Telematics International, Inc. recently announced the second T1 switch said to take advantage of the dynamic bandwidth allocation capabilities of frame relay technology.

The company said its Series 9000 FRX switch supports 10,000-plus frame/sec. transfer rates as well as transparent interconnection across existing, nonframe relay high-speed backbones. Stratacom, Inc. recently introduced the frame relay version of its IPX switch [CW, Feb. 5].

The statistical multiplexing backbone product debuted at the Communications Network '90 show in Washington, D.C. According to Lawrence Cattell, vice-president of marketing, the switch is targeted at network designers. It enables them to handle existing networks and provides a migration path toward private broadband Integrated Services Digital Networks and wide-area networks, he said.

"Frame relay standards have not been established," Cattell said. "We feel that transparency takes a practical approach to interconnection."

Using the frame relay networking concept, the S9000 FRX allows the user to migrate multimedia traffic onto a single network and offers support for existing frame-oriented protocols, including High-Level Data Link Control, Local-Access Protocol B and Synchronous Data Link Control. The switch provides frame relay support via the use of proprietary fast-packet methods and protocols.

The switch can be configured for four to 16 communications channels, with maximum line speeds of 10M bit/channel.

Scheduled for shipment in the third quarter, the S9000 will provide a transparent frame transfer mode operation and will cost between $50,000 and $130,000, depending on user configuration.

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NEW PRODUCTS

Network management

Clear Communications Corp. has announced a software-only version of the Clearview Surveillance System, designed to reduce the cost of the Clearview wide-area T1 network management system.

The product integrates intelligent Channel Service Unit hardware from Larse Corp. for on-line data collection and T1 diagnostics. The latest development gives managers real-time decision support for common carrier-provided T1 facilities in wide-area networks. In networks with existing Larse CSUs, the cost is $31,500 for monitoring 15 T1 links, plus $10,500 for each additional five links.

Clearview Communications
100 Tri-State International
Lincolnshire, Ill. 60069
708-317-2500

Customer-premises equipment

AT&T has enhanced Manager III, its systems management software for Definity Communications System Generic 2 customers.

Manager III features now include support for diagnostic maintenance procedures and support for System 85 and Dimension private branch exchanges. Customers can now maintain all of the mentioned switches via Manager III's Basic Mode. Scheduling, scripting and support for windowing terminals is also included. Manager III will ship in the second quarter, and the software is priced from $10,000 for the first switch administered.

AT&T
55 Corporate Drive
Bridgewater, N.J. 08807
800-247-1212

Links

Electronic Modules, Inc. introduced a switch designed to expand the capabilities of a single telephone line to accommodate a telephone, facsimile machine and/or a computer modem. The Smartfax Switch handles incoming calls and is compatible with any type of facsimile machine, the company said. It may be used in either automatic or manual modes. The unit is fully programmable and costs $299.

Electronic Modules
10401 Vista Park Road
Dallas, Texas 75238
214-340-6789

Peer-to-peer communications between different manufacturers' computers can be accomplished using Peer 6.2 software from Architectural Integration, Inc.

With a single program statement, applications using terminal emulation or general data stream can be upgraded to call Peer 6.2, making the programs IBM Systems Application Architecture/Common User Access-compliant.

The callable module need not reside in a particular manufacturer's computer and is not limited to mainframes, minicomputers or microcomputers. Prices start at $25,000.

Architectural Integration
322 E. Washington St.
North Attleboro, Mass. 02760
508-643-0700

Modems

Codex Corp. introduced a point-to-point leased-line 19.2K bit/sec. modem.

Designated the Model 3380, the unit uses a line-quality feature that offers the user two Trellis Coded Modulation schemes. It incorporates a two-channel time division multiplexer with four- and six-channel configurations also available. All ports provide asynchronous-to-synchronous conversion.

The modem costs $2,995 and comes with a one-year on-site warranty.

Codex
Maresfield Farm
7 Blue Hill River Road
Canton, Mass. 02021
617-364-2000

Vocal Technologies Ltd. unveiled a modem created specifically for use with battery-powered laptop computers.

Designated the Stowaway 2400, the unit permits data communication by utilizing the telephone line power source and measures 2 by 3 by ¾ in. It weighs 2.2 ounces and is compatible with IBM and Apple Computer, Inc. architecture via a standard RS-232 serial interface. It is priced at $225.

Vocal Technologies
3032 Scott Blvd.
Santa Clara, Calif. 95054
408-980-5181

Gateways, bridges, routers

Timeplex, Inc. announced a facsimile server designed to act as a bridge to the corporate digital data network by converting analog fax traffic to digital format.

The Fax Server will reduce long-distance telephone charges for fax calls and improve transmission quality by converting CCITT Group III analog facsimile signals to digital format for transmission at speeds of 14.4K, 9.6K or 4.8K bit/sec.

The product costs $2,795.

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Woodcliff Lake, N.J. 07675
201-391-1111

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CPAID – Master Tax/Electronic Tax Filing
D3 SOFTDESIGN – Sync Tax, BSC 3780, Sync-Claim
EASTHAM & ASSOCIATES – UNISYS Basic Emulation
EMERALD TECHNOLOGIES – 3X Mate, 3X Mate UNIX
FORETELL – ESP II, EDI FACT
MICRO INFORMATION SYSTEMS – ECS Electronic Claims System
NETWORK SOFTWARE ASSOCIATES – Remotetalk, ADAPTSNA, 3270 V4, LU6.2 V4, LUO V4, RJE V4, API, HLLAPI
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MANAGER'S JOURNAL

EXECUTIVE TRACK

Roy Levi has been named to the newly created position of vice-president, information services at **Prime Time 24** in New York. Prime Time 24 is a satellite broadcaster delivering network television to satellite dish owners nationwide.

Levi's primary responsibility is evaluation and improvement of Prime Time 24's customer management information system.

Levi was previously director of systems development at Cable Tek for five years. Before that he was an electronic DP management consultant at Price Waterhouse and worked in systems development at McGraw-Hill, Inc. and Western Electric. Levi holds a bachelor's degree from City College of New York and an MBA from Pace University.

……

John C. Martin has been named managing director of the **Automotive Industry Action Group** (AIAG) in Southfield, Mich.

Martin will be responsible for the organization's operations and program activities. The AIAG is an association formed to help the North American automotive industry increase its productivity. Part of the AIAG's work involves helping to establish ANSI X.12 standards for electronic data interchange.

Martin, an executive on loan to the AIAG from General Motors Corp., is a graduate of West Virginia University. He has been with GM since 1965 and has been working with the AIAG for one year.

……

Who's on the go?

Changing jobs? Promoting an assistant? Your peers want to know who is coming and going, and *Computerworld* wants to help by mentioning any IS job changes in Executive Track. When you have news about staff changes, be sure to drop a note and photo to or have your public relations department write to Clinton Wilder, Senior Editor, Management, *Computerworld*, Box 9171, 375 Cochituate Road, Framingham, Mass. 01701-9171.

Systems steeled for change

Lutz's recipe for Armco success: Think small to survive in a changing environment

BY RICHARD PASTORE
CW STAFF

In his quest to overhaul an obsolete, disjointed information systems group at Armco Advanced Materials Corp., Tom Lutz relied heavily on his two favorite caveats — think small, and don't try to justify anything.

From this, it may sound like Lutz is not your most ambitious chief information officer. Far from it: According to his peers, Lutz is a turnaround manager, and his rules of thumb are dynamic and innovative.

"He's the type you bring in to strengthen or refocus an organization," says John Robb, vice-president of human resources at Armco, a Butler, Pa.-based steel maker.

Lutz, the son of a Midwestern preacher who himself lectures to Christian youth groups, eagerly sermonizes on the evils of the large, long-range IS project.

"The super-big project is doing the company a disservice because the business is changing so rapidly," he professes.

"I say, let's build what we need in the short term, making sure it's open-ended for the future," Lutz says. "We're building a system that will always be changing, but shouldn't it be?"

Armco just wrapped up a $5 million networking project that linked Digital Equipment Corp. Vaxclusters at its widely dispersed plants. The effort took only nine months — Lutz's maximum time allocation for any project.

Lutz learned the hard way to limit the scope of projects as IS chief at the Mayo Clinic and Foundation 10 years ago. After spending a year and a half designing a laboratory system, he realized it would not support the hospital's new direction. Pulling the plug "was very painful; people had become emotionally attached to it," he says.

Continued on page 66

PROFILE: Tom Lutz

Mark Bolster

Position: *Chief Information Officer, Armco Advanced Materials Corp.*
Mission: *Turning around outdated IS group while keeping systems open for future change*

Be all you can be: Maslow as IS guidepost

BY CLINTON WILDER
CW STAFF

Memorizing the levels of Maslow's hierarchy of human needs is *de rigueur* in any college course on developmental psychology. But how about Maslow's hierarchy as a model for the coming of age of the information systems profession?

Charles McCaig, senior vice-president of IS at Mutual Benefit Life Insurance Co. in Newark, N.J., presented that unique analogy at a recent *CIO* Magazine/AMR International conference of IS executives in Laguna Niguel, Calif. An undergraduate philosophy major, McCaig sees the maturation of IS from back-office support to strategic imperative as paralleling psychologist Abraham Maslow's five-step progression to personal self-fulfillment:

1. **Survival.** Like humans seeking only the basic necessities, McCaig said, data processing shops in the 1960s faced the challenge of building systems that would simply do what they were supposed to do. "It was about a 50-50 chance whether they would run at all," he said.

2. **Security.** According to Maslow, after man learns to find the basics of food, clothing and shelter, his next need is to protect them. According to McCaig, this was the beginning of the IS fiefdom and bureaucracy — protecting systems, mistrusting users and promulgating strict rules for them.

3. **Social acceptance.** McCaig believes that most IS organizations have reached Maslow's third level, where the need to belong to the larger society around you is paramount. In IS terms, the current push toward partnership with line managers and alignment of technology planning with business strategy reflects this.

4. **Self-esteem.** The need to distinguish oneself from social peers is reflected in attempts to raise the profile of IS within the organization. Since acceptance has already been achieved, there is less need for central control, and the IS department can empower new parts of the company.

5. **Self-actualization.** For IS, Maslow's "be all you can be" top level represents IS fulfilling its potential by changing the way the business is run. Few IS departments have reached this level on a consistent basis, McCaig said. Even a successful IS progression through Maslow's hierarchy is a fragile achievement. "After a merger and a new boss, many organizations get knocked down one or two levels and have to climb back up," McCaig said. "That is very harmful."

TAKING CHARGE

Sigmund A. Rosenthal

New tricks for organizations

You can teach an old dog new tricks. You can teach a programmer new techniques. And you can even teach an organization new methods. But it isn't easy.

The trick is in recognizing your audience. There usually isn't much difficulty distinguishing old dogs from programmers. However, it is difficult to distinguish programmers from their organizations.

I learned this when I was teaching at IBM's Systems Research Institute. Occasionally, I'd recognize someone from an earlier course.

A typical conversation went as follows:

Me: Weren't you in a systems design class before?

Student: Yes, and I really enjoyed it.

Me: Well, how is design going?

Student: It was a good class, and I learned a lot.

> IN ORDER to make the new technique as palatable as possible, it must be at least as easy to use as the older method.

Me: Oh, that's good. So, how is your design work going?

Student: Oh, I'm definitely much better at my job.

Me: So, how is the design going?

Student: You know, I really enjoyed the class. I learned a lot from it, including some new jokes, and you even kept our attention for the whole week.

Me: But how is your design work really going?

Student: Well — I really don't do it. Nobody understands what I'm talking about. I guess my shop just isn't ready for it.

Eventually, I realized I was teaching the wrong audience. I should have been teaching the organization, not the individual. I now distinguish the things I teach an individual from things that must be "taught" to an organization.

For example, I can teach new ways of coding a "Perform" statement to an individual. However, teaching a new way to put a program into production is useless unless the organization supports the new methods.

Teaching an organization new development techniques is much more difficult than teaching an individual. In order to change an organization, all the individuals within it must change their behavior at the same time. That requires a carefully planned effort to overcome resistance and provide support for the new method before any classroom training takes place.

In any organization, most of the people either won't care or will mildly resist change. To overcome this, there must be some people who strongly want to change, and they must be able to influence the others.

There are two types of influence that must be brought to bear: management and respected peers. This means that you have to identify the techies who are highly regarded by their peers and convince them and management, maybe for different reasons, that the change will be beneficial to their organization and to them.

In order to make the new technique as palatable as possible, it must be at least as easy to use as the older method. Since the older method has probably developed a support structure, either administrative or tool-based, the new method has to have, at a minimum, the same level of support available.

The training must be given to all the staff who will be affected by the new method. There may be different classes for the managerial, technical and administrative staff, but they must all know how to perform in the new environment. Management especially should understand how the change will affect the performance of the technical staff.

It is easier for an organization to form new habits than for an individual. When an individual slips, there is no one else to notice and reinforce the desired behavior. When an individual in an organization slips, others in the organization can make the necessary correction.

Since programmers rightfully resent the "method of the month" philosophy, the new method should have a set trial period. After the trial period, if the new method does not prove productive, it should be dropped.

The initial planning must set up procedures to collect the data that is necessary to make this decision. Everyone associated with the new method should know from the outset that it can be dropped.

Starting a new method is not easy, but it can be done. I have done it with organizations ranging in size from five to 450 people. Like many other processes, it's the early planning that makes it successful.

Rosenthal is a computer consultant based in Rye, N.Y.

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BOOK REVIEW

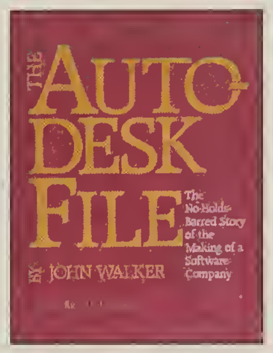
Autodesk's history retold by memos and minutes — not people

The Autodesk File
By John Walker
New Riders Publishing, $24.95

Autodesk, Inc. was one of the great unheralded software success stories of the personal computer revolution. Started in 1982 on a $59,000 shoestring, the company grew to a $117 million giant in just seven years. Not only does it own the market for computer-aided design and manufacturing (CAD/CAM) on PCs, it practically invented the concept of downsizing software from expensive workstation platforms to low-cost desktop machines.

With all that going for it, it's a shame *The Autodesk File* isn't a better book. Autodesk co-founder John Walker has chosen an unusual and risky way to present the start-up's story, fashioning it out of backfiles of memos, meeting minutes and press releases. Walker has an advantage here: He is a clever and fluent writer.

Unfortunately, the risk doesn't pay off. One of the things that usually makes successful bootstrap operations so interesting is that their people come together in a flash of creative energy that happens in just the right place at just the right time.


THE
AUTO
DESK
FILE
The No-Holds-Barred Story of the Making of a Software Company
BY JOHN WALKER

It's people who make such stories compelling, not product specs. But *The Autodesk File* gives little sense of the personalities who shaped the company. By confining his story to an apparently lightly edited collection of internal memos, Walker has taken all of the life out of Autodesk. We hear of the long hours but don't see them taking their toll. We see agonizing decisions being made but don't experience any of the angst. *The Autodesk File* is an antiseptic book about a gritty process.

It also would have benefited from stiff editing. Its nearly 500 pages meander through too many long-winded technical discussions. At one point, a clever literary allusion to *Atlas Shrugged* turns into a 10-page explanation of operating system binary code compatibility that will be indecipherable to the nonprogrammer.

Autodesk's story was made all the more remarkable by the fact that its product, a $1,000 CAD package, was successful selling at a premium price in what had traditionally been a technically oriented niche market. Walker is evidently proud of that fact, and tells and retells the company's success story ad nauseum, to the point that *The Autodesk File* at times reads more like an exercise in ego gratification than a business biography.

At one point he reprints a vapid corporate background statement prepared by a public relations agency at Autodesk's request in 1985, complete with dozens of Walker's own withering margin notes. The document is indeed awful, but the chapter contributes nothing to the story, and the snideness of Walker's comments only serves to make the reader feel that Walker is not a very nice person.

To its credit, *The Autodesk File* includes some useful material for the budding software entrepreneur as well as the PC industry historian. Walker's January 1982 memo to the programmers who would soon form Autodesk is prophetic: "It's a rare piece of luck to have the field you've chosen . . . explode into the hottest growing entrepreneurial arena just as you hit your prime." And explode it did.

His plain-English explanations of how venture capital, stock options and public offerings work are pointed and sometimes very funny. History buffs will get a kick out of remembering what a convoluted place the desktop market of the early 1980s really was. Memos from 1982 and 1983 center on issues such as whether to write for the Texas Instruments, Inc. 9900 and Digital Research, Inc. CP/M-86 environments.

The last third of the book is generally well-paced and entertaining as Walker ruminates on the company's success and airs some of his more philosophical thoughts about computers, automation and the human race. It's good stuff.

However, who's going to stay with *The Autodesk File* long enough to get there?

PAUL GILLIN

Gillin is *Computerworld's* executive editor.

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TI also provides you with a workstation printer solution. The Model 830 and 835 printers combine such personal printer features as an easy-to-use control panel and key forms printing features like short tear-off and a straight paper path.

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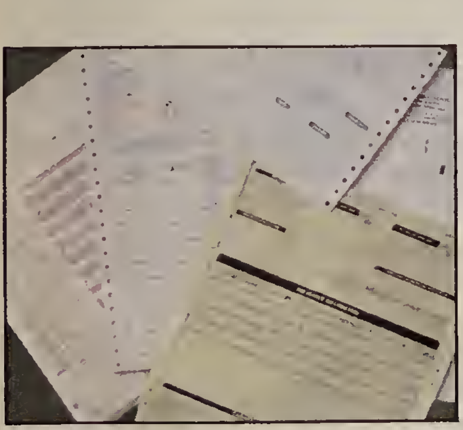

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Systems

CONTINUED FROM PAGE 63

Lutz, 52, has been around long enough to know that "IS is always the whipping boy. We're our own worst enemy because we don't know how to stand up and say to users, 'We're not going to justify this [new system] for you.' "

At Armco, it is the users who go before the board to justify their computing needs. "This makes the users the owners of the system and its benefits, and it makes them accountable for realizing those benefits," Lutz explains.

However, Lutz is not shirking responsibility. He has helped devise a four-page quarterly performance report for his department that is available to all the company's executives. The report charts IS performance by measuring historical and projected operating budgets, spending, staffing, training, end-user computing activity and other factors.

Lutz's performance has measured up admirably, according to his colleagues. When he signed on with Armco in September 1988, the firm was a ship without a compass.

"Our biggest handicap was that the information and automation group was dispersed, which didn't allow us to focus our efforts," says Terry BeCraft, the manager of information and automation and a 16-year Armco veteran.

The company's "informational fiefdoms," as Lutz calls them, each managed their own data without regard to overall company goals.

Symptoms of mismanagement included redundancies and conflicting data. In his initial "information diagnostics" study, Lutz even discovered that one systems employee was still generating reports for which no executive had had any need in the last 10 years.

Lutz began by farming out his 55 staffers to different sections of the business in a kind of corporate musical chairs. "It was tough for the first three months, but they began to realize they were learning more about the business and increasing their value to the company," Lutz recalls.

Once his people had developed an eye for the big business picture, Lutz set out to upgrade and integrate the systems. "The average age of the computers then was three years," Lutz says. "But the average age of the application software was 17 years. We were being held hostage as a business by old systems."

Lutz scrapped the moldy in-house applications and standardized on third-party packages. Then, armed with a customized networking scheme, he tackled the goal of companywide access to consistent data.

Users can now tap the same information across departments and across state lines, whether they are logged onto the steel plants' DEC Vaxclusters, the corporate IBM 3081, the 500-node Apple Computer, Inc. and IBM Personal Computer end-user network, or the new executive information system.

"A lot of people write about an inte-

Winners

"I'm not a jockey," insists Tom Lutz, chief information officer at Armco Advanced Materials, Inc.

Lutz, who uses a race horse analogy to describe his stable of information systems professionals, says he does not "ride" his staffers. He would rather see himself as a trainer — and a smart handicapper.

"I do everything I can to develop them, and then I bet on them. I win, and the business wins, if they run a good race," Lutz says.

Lutz says he looks to hire people that he would like to work for since he fully expects them to pass him on the corporate ladder someday, either at Armco or another company.

In his professional career, Lutz estimates that 35 people he has hired or developed have gone on to be presidents or vice-presidents of firms.

"Tom's a very good personnel developer; he takes a lot of pride in growing people," says Armco's manager of information and automation, Terry BeCraft.

John Robb, Armco's vice-president of human resources, also credits Lutz's personnel development style. "He develops managers that can really come out of [information and automation] and manage other types of functions in an organization," Robb says.

In fact, Lutz guesses that in a given year, information and automation loses 10% to 15% of its key players, who migrate to management posts in other company divisions.

One key to this employee versatility is training. When Lutz came on board, information and automation staffers averaged just 1.3 training days per year. Lutz has upped that average to 11. Many are taking business courses, and several will be earning MBAs this year, he says.

Another factor is the close relationship information and automation maintains with Armco's business functions. Managers in user areas such as finance spend considerable time coaching information and automation employees on the workings of their divisions.

RICHARD PASTORE

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grated information organization," Lutz says. "We're doing it because our executives understand that information is part of the product."

In the steel industry, "part of the product" is more than just a catchy phrase. In the last three years, sophisticated Armco customers such as General Electric Co. and Westinghouse Electric Corp. have begun requiring significant data on the conductivity properties and forging process of the electrical steel they purchase.

"They are emphasizing quality information as well as product quality, and they're going to go to someone who can provide it," BeCraft says.

It is inherently difficult to track down and pull together such diverse data as forging temperatures and chemical treatments to send to customers with their custom steel orders. Before integration, "sometimes the product would arrive ahead of the information, or there would be gaps," Lutz recalls.

Now, Armco's integrated system allows the data to flow in tandem with the steel as it moves through the production process. The result — more timely, complete data — was instrumental in closing a recent contract with a major new customer, Lutz says. "There are a lot of people that can produce good steel, but we get a competitive advantage by also giving good information."

There is more work to be done; 1990 will be the year to make sure the new setup is stable. Electronic data interchange with customers and suppliers will be expanded. Lutz also plans to address a way to monitor the business to anticipate needed systems changes.

Firm overseer

Meanwhile, Armco has just awarded Lutz with the additional responsibility of overseeing the firm's entire procurement operation.

However, one wonders how long Armco can keep Lutz busy after he completes his IS turnaround.

If anything, Lutz is restless. He has packed up his wife and three children eight times to move on to new professional challenges in new locations.

"I get very bored with the day-to-day stuff," he says. "Give me a problem; I love to go where there's trouble."

CALENDAR

The changing business environment and ways in which the strategic use of information systems can help make an organization more competitive will be the focus of an Arthur D. Little, Inc. conference next month.

"Implementing the Information-Based Organization" will be held March 15-16 in Rancho Mirage, Calif. Business futurist Peter Drucker and senior consultants from Arthur D. Little will address the issues of how U.S. companies are not going far enough to seek a competitive edge in the global marketplace and how the marriage of technology, culture and business acumen is necessary to eliminate management layers, streamline operations and become more responsive to customers.

For more information, contact Georgann Lieb at Arthur D. Little in Cambridge, Mass. (617) 639-0208.

MARCH 4-10

Digital Equipment Computing Users Society Northwest Regional Conference. Bellevue, Wash., March 4-6 — Contact: Steve Lorenzen, Bellevue, Wash. (206) 284-4316.

Share 74. Anaheim, Calif., March 4-9 — Contact: Share, Chicago, Ill. (312) 644-6610.

Government Open Systems Interconnection Profile. Vienna, Va., March 5-6 — Contact: Omnicom, Vienna, Va. (703) 281-1135.

Computers in Libraries. Arlington, Va., March 5-7 — Contact: Meckler, Westport, Conn. (800) 635-5537.

Corporate Contingency Planning Seminar and Exhibition. Palm Springs, Calif., March 5-7 — Contact: Disaster Recovery Journal, St. Louis, Mo. (314) 846-1001.

EDP Audit Managers Roundup IX. Orlando, Fla., March 5-7 — Contact: MIS Training Institute, Framingham, Mass. (508) 879-7999.

Interface '90 Plus. Dallas, March 6-8 — Contact: The Interface Group, Needham, Mass. (617) 449-6600.

IS Performance/Capacity Management Conference. Tucson, Ariz., March 6-9 — Contact: Applied Computer Research, Phoenix, Ariz. (602) 995-5929 or (800) 234-2227.

Statistical Process Control. Atlantic City, March 7 — Contact: TTC Seminars, Torrance, Calif. (213) 534-3922.

Canadian Executive Symposium on Unix and Open Systems. Toronto, March 7-8 — Contact: Heidi Spry, Datapro Canada, Scarborough, Ont., Canada (416) 298-1177.

Europe 1992 Market Update. New York, March 7-8 — Contact: Frost & Sullivan, New York, N.Y. (212) 233-1080.

National Credit Card Forum II: Coping with Market Saturation. Tarpon Springs, Fla., March 7-9 — Contact: Frost & Sullivan, New York, N.Y. (212) 233-1080.

The Three Rs of Software Automation. Washington, D.C., March 7-9 — Contact: Extended Intelligence, Chicago, Ill. (312) 346-7090.

MARCH 11-17

Guide 76. San Francisco, March 11-16 — Contact: Guide Heaquarters, Chicago, Ill. (312) 644-6610.

International Telecom Liberalization Conference. Washington, D.C., March 12-13 — Contact: Telecommunications Reports, Washington, D.C. (202) 347-2970.

Program on Negotiation for Senior Executives. Cambridge, Mass., March 12-13 — Contact: Julie Dunbar, Center for Management Research, Wellesley, Mass. (617) 239-1111.

Controlling Software Projects. Washington, D.C., March 12-14 — Contact: Technology Transfer Institute, Santa Monica, Calif. (213) 394-8305.

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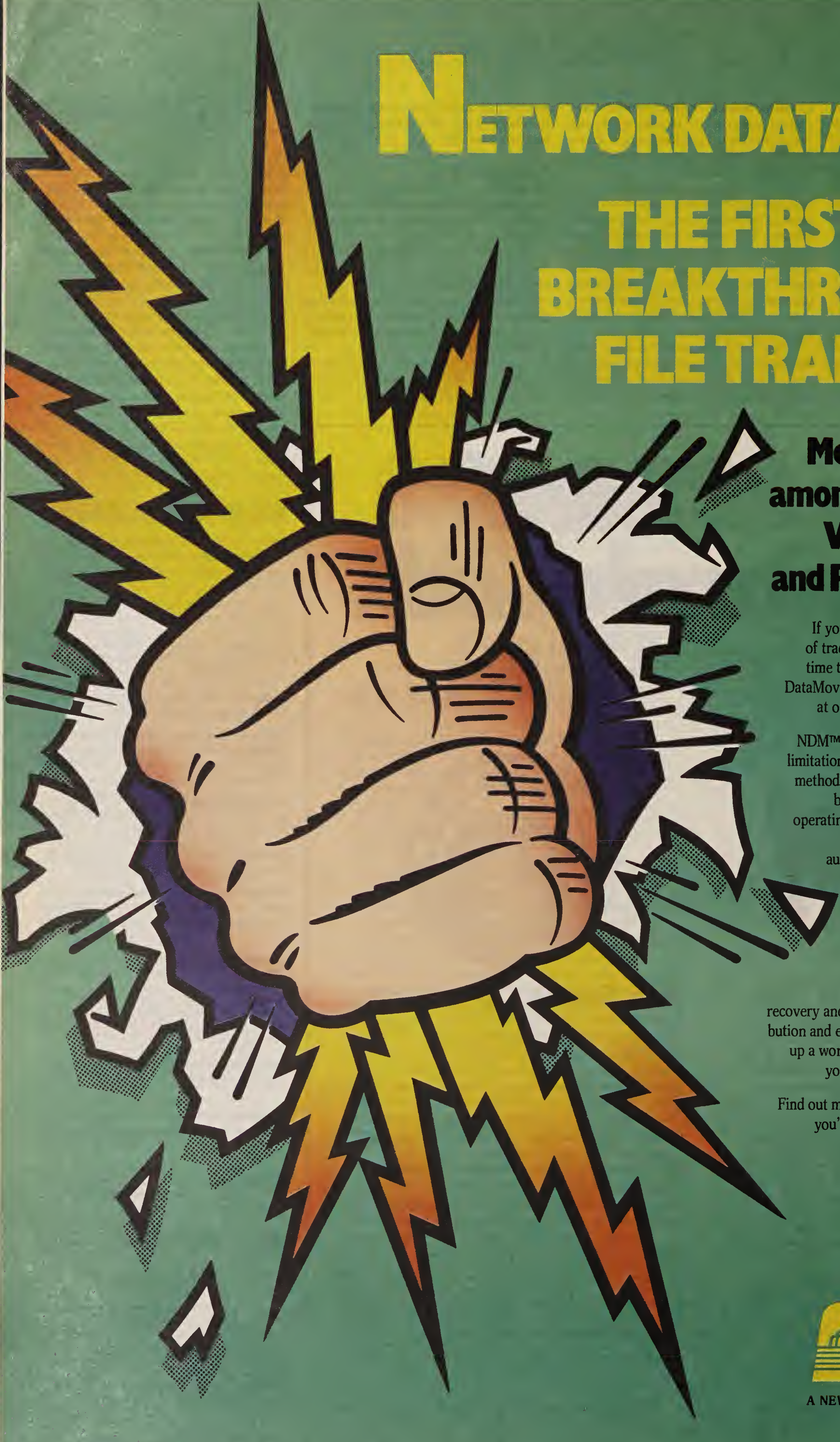

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H-CWX-900219

Everyone's integrating, but in their own way

BY ANN DOOLEY
CW STAFF

Integration — top executives don't understand it, technology often doesn't permit it, and no one does a very good job defining it. Nevertheless, information systems managers are plunging ahead into integration projects with some surprisingly similar views about what the term means to them.

In order to cut through any confusion wrought by vendor hype and high expectations, *Computerworld* conducted an exclusive survey of 129 members of the *Computerworld* Editorial Board of Information Managers to find out what their integration plans are.

EXCLUSIVE COMPUTERWORLD SURVEY

Although 56% of the *Computerworld* respondents agreed that integration was an overused and poorly defined term, all the managers said they had integration projects well under way. Those interviewed seemed to have a very clear idea of what integration means when applied to their own projects and companies but agreed that individual definitions may not match what competitors and other companies may be doing.

Organizations are defining integration in their own terms. Rick Marolt, information resources manager at Great Central Insurance Co. in Peoria, Ill., defines it as "a way of making PC-based, network-based and mainframe-based systems as interoperable as possible — in other words, diversity that's tied together." According to Marolt,

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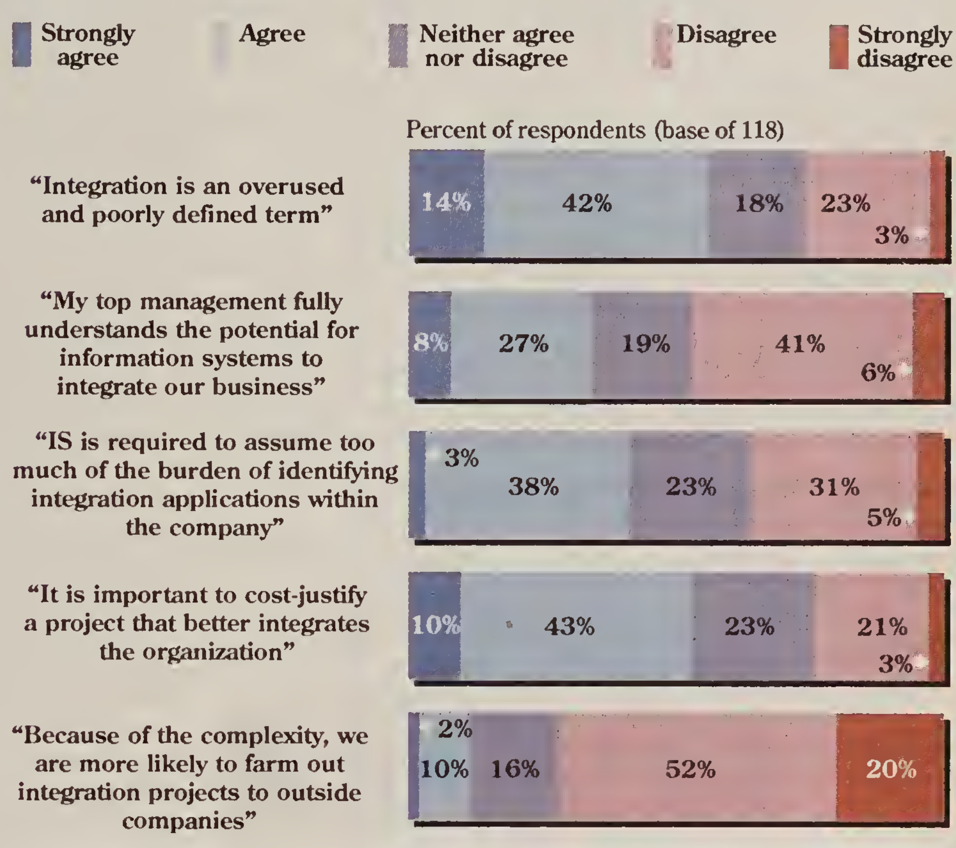
Terms of agreement

How much do you agree with each of the following statements



Source: *Computerworld* Survey

CW Chart: John York

Customer closeness at Bergen Brunswig, McKesson

Automating the logistics chain speeds delivery and cuts costs for competing health care product suppliers

INTEGRATING THE CUSTOMER:
- McKesson
- Bergen Brunswig

BY JANET FIDERIO
SPECIAL TO CW

Bergen Brunswig Corp. may soon be reading its customers' minds. The health care distribution company's goal is to be so attuned to its customers' needs that it will anticipate orders before they're placed. But what sounds like clairvoyance is actually a matter of communications, as automated distribution systems continue to move many manufacturers and distributors closer to their customers.

"We want to be able to call buyers for a retail chain and say, 'According to our information, you're dangerously low on Tylenol. You went into your safety stock at two o'clock at store No. 16. Don't you think we ought to get you some?' " says Bernie Hale, vice-president of distribution services at Bergen Brunswig. In such a scenario, Hale says, Bergen Brunswig would monitor store inventories in real time and automatically replenish depleted supplies. The retail store manager never has to place an order.

This scenario may be futuristic, but for many manufacturers and distributors, reorganizing and integrating functions and information in the logistics environment makes good business sense. Bergen Brunswig's move toward value-added services and speedy delivery is a direct response to competitors such as McKesson Corp., which has its own automated delivery system. In fact, automation for many manufacturing and distribution companies has turned into a weapon in the battle to become the lowest cost supplier.

"Stores are becoming more attuned to who their customers are," says Tom Tubergen, a partner at Chicago-based Andersen Consulting. Retailers are insisting on better service and are much less understanding when it comes to delivery delays, stock-outs and inconvenient ordering.

Retailers, distributors and manufacturers alike are also becoming more concerned with minimizing inventory costs. Some have already made the transition to just-in-time delivery cycles. "When companies think of ways to take time out of the supply chain, they reduce their inventory," says Jim Seber, vice-president of logistics at Tarrytown, N.Y.-based Management Dynamics, Inc., a consulting group.

Larry Rose

Hale *wants Bergen to anticipate customer needs*

With just-in-time delivery, manufacturers or distributors can receive a customer order in the afternoon, fill it in the evening and deliver it the next day. The company may, in turn, require just-in-time delivery from its suppliers, further increasing inventory turnover. The result is to free up corporate capital formerly tied up in inventory, Seber says. For a just-in-time system to work, however, information systems managers must integrate the logistics environment — shipping, receiving, warehousing and delivery — into the manufacturing, accounting and IS loop.

For health care supply mega-distributor McKesson, timing is everything. The company supplies over 15,000 customers — hospitals, drug-chain warehouses, independent retailers and small chain drug stores. It does so through night order processing (generally considered nonproductive time) and next-day delivery that is made possible through electronic order entry, which takes

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Page 85

Integrating

FROM PAGE 69

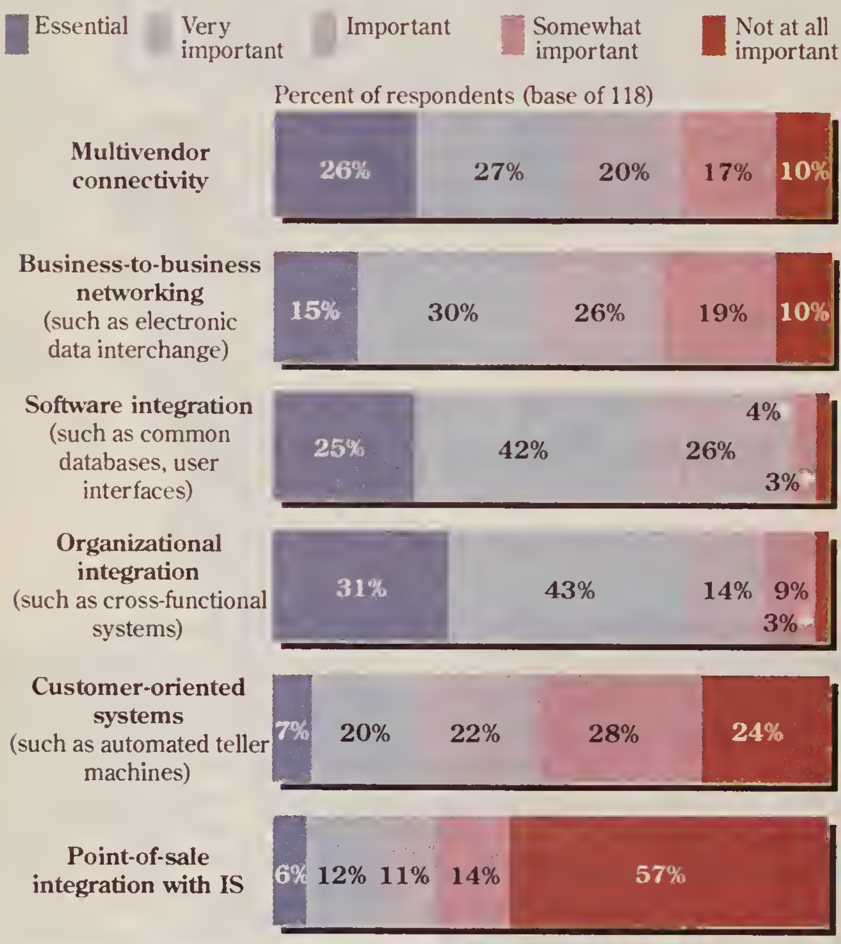
Great Central Insurance is currently connecting personal computers and Apple Computer, Inc. Macintoshes to a remote mainframe and attempting to implement on-line access to banking and outside payroll services.

EXCLUSIVE COMPUTERWORLD SURVEY

Joseph Vincent, director of technology planning at Humana, Inc., advises his peers that an integration definition begins with defining the goals and needs of the company. At Humana, "we call it enterprise modeling," Vincent explains. His advice is to "define the functions of the enterprise, then look at data modeling [and] then group data by subject areas. Think in terms of applications that need to be serviced." That is what Humana, a health care company located in Lousiville, Ky., is in the process of doing, according to Vincent.

Business lifelines

Rate each of the following integration concepts in terms of their importance to your business



Source: *Computerworld* Survey

CW Chart: John York

"Enterprise modeling is nothing but hard work and political battles. It can be a discouraging thing to look at the grand design, so you have to take it one step at a time," Vincent notes.

Companies in the CW survey reported that they were planning and implementing a number of integration projects. Seventy-two percent are in the midst of either business-to-business networking projects, such as electronic data interchange (EDI), local-area or wide-area networks, or software integration projects such as common databases or user interfaces. EDI was generally considered to be an increasingly essential part of customer service, respondents noted. Integrated databases were often viewed first as a strategic asset for a business and second as a means to save time and money.

The next most common integration project — cited by 70% of the survey participants — was multivendor connectivity, often for the purpose of connecting applications from different departments. Connecting computer-aided design applications was the most commonly cited function.

Fifty-four percent of the companies surveyed were undertaking organizational integration — department-to-department as well as cross-functional — which is a goal they said they consider crucial to their plans. Customer-oriented projects such as automated teller machines came in at 39.8%, with point-of-sale and factory-floor automation mentioned by 24% of IS managers.

What kind of impact is integration making in companies? Vincent says his organization's goal is to streamline the company to be more competitive. "It's hard to respond to market changes if you have hundreds or even thousands of isolated systems to change. We need to integrate our systems, technically and organizationally, in order to be more responsive," he says.

In terms of importance, IS managers participating in the survey said they consider organizational integration to be the key part of an integration strategy (see chart this page). Thirty-one percent rated organizational integration, which deals with interdepartmental or cross-functional systems, as "essential," with 43% rating it as "very important." This indicates that the most critical element of successful integration is not the technology per se but rather the culture of the organization and the commitment to implementing integration in the company.

Unfortunately, many companies fail to exploit strategic opportunities because doing so requires integrating several parts of their businesses. These opportunities are either unrecognized or not attempted because of barriers and systems limitations from the organization itself, according to Thomas Madison, vice-president at the United Research Information Technology group at United Research Co., a management consultant firm located in Morristown, N.J.

Many companies are structured around strongly defined barriers of product lines, customer segments, geography or turf. These cross-cutting opportunities are difficult to integrate across customers, products, functions and markets because of incompatible data structures, applications or operating environments, he notes.

In light of this kind of divergence, it seems appropriate that organizational politics was ranked as the No. 1 obstacle to successfully integrating business efforts by 67% of those participating in the *Computerworld* survey (see chart this page).

Much the same

In a survey conducted last July by United Research, the company had similar results. In the study, 44% of top managers and 61% of CIOs cited turf battles as an obstacle to strategic plans. United Research also found that 55% of top managers and 61% of CIOs believe an organizational culture resistant to change is an obstacle to effective use of information and integration resources. "We have observed that the nontechnical areas of implementing information systems are the greatest barriers to implementing new business strategies," Madison explains.

The issue of cost justification was another sticking point to successful integration, according to the *Computerworld* survey. Approximately half of the IS respondents said it was important to cost justify an integration project, with one quarter disagreeing.

In the United Research survey, two-thirds of top managers and CIOs agreed that they do not have an effective process for measuring their return on investment in IS. The difficulty is that clear-cut benefits do not always exist. How can you assign a dollar figure to better quality information or added customer service?

But some companies manage to quantify benefits. "We are able to measure the benefits and cost-justify each individual project," says Diane Coleman. Coleman, MIS director at Fleetguard, Inc., a heavy-duty filtration manufacturer based in Nashville, adds that the benefits of the company's overall integration plan will end up being greater than that of its parts.

Fleetguard is in the midst of a five-year project to integrate the company's engineering, manufacturing, cataloguing and other departments through a common-interface database at multiple locations.

"Through this five-year plan, we're already seeing benefits we weren't even able to think of when we started out," she states. Systems are giving Fleetguard precise customer feedback, which gives the company better information to work with, which has reduced the cost of product design. Such unexpected gains are adding to the overall value of the system, according to Coleman.

Only after people and money concerns did technology appear as an obstacle, with respondents saying vendors' proprietary systems (44%) and the lack of standards (42%) hamper successful integration efforts.

In the CW survey, nearly half of the respondents felt that top management does not fully understand the potential that integration and IS can have on their business, with 35% saying that top management understands the strategic implications of integration. In this vein, top management was also considered to be an obstacle to integration plans by 22% of the respondents, but those surveyed said organizational, monetary and technology issues were more disruptive.

Stonewall tactics

What are the biggest obstacles your firm faces when trying to successfully integrate business efforts, both internally as well as through links with suppliers and customers?

Percent of respondents (base of 116)
Multiple responses allowed

①	Organizational politics	67%
②	Cost justification	48%
③	Vendors' proprietary systems	44%
④	Standards	42%
⑤	Technology	34%
⑥	Top management resistance	22%
⑦	Supplier and customer resistance	10%

Source: *Computerworld* Survey
CW Chart: John York

The reasons survey respondents were attempting integration projects were diverse, but the respondents said their goals were customer satisfaction, increase in productivity, cost control and better decision-making as well as the ability to formulate new products and services and provide a competitive edge.

> "IT'S HARD to respond to market changes if you have hundreds or even thousands of isolated systems to change."
>
> JOSEPH VINCENT
> HUMANA

Even with these individual efforts, the integration market overall has shown slower growth than originally expected. This is partly a result of the marketplace confusion, according to Jeff Kaplan, director of networks and professional services at The Ledgeway Group, a research firm in Lexington, Mass.

"We're dealing with fads in terminology as much as anything else. It's too bad we can't establish a language police who could issue fines for misuse of terms," Kaplan jokes.

The next fad term is probably going to be outsourcing, according to Kaplan. The integration market is proving disappointing to some systems integration vendors with a gold rush mentality. They found that companies in the commercial sector, unlike the government sector, often start out one project at a time rather than putting all their eggs in one vendor's basket. This is where outsourcing integration projects to vendors comes in. Vendors see outsourcing as a way of graduating from the one-project buy at companies to providing facilities management for the entire site.

The time seems to be right for outsourcing, according to Kaplan, who notes that vendors are finding it difficult to differentiate themselves by the technology alone so they are turning into service providers.

But responses to the CW survey show that this market may not be as golden as systems integrators think. In fact, nearly 72% of the organizations in the CW poll said they are not likely to farm out integration projects because of their complexity.

Users and analysts alike agree that individual companies have a clear sense of what integration means to them. Even though individual definitions of integration vary, companies are hot on the trail of integration in their own companies.

Dooley is *Computerworld's* editor, integration strategies.

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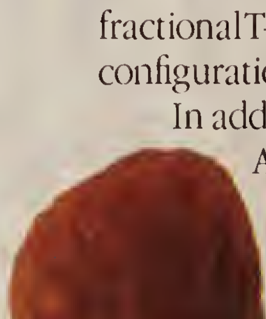

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Closeness

FROM PAGE 69

the lead time out of customer ordering.

"A customer in Atlanta might transmit an order to Rancho Cordova, [Calif.,] at 6 p.m. Eastern Standard Time, and by 9 p.m. that order will have gone from Atlanta to Rancho Cordova and back to McKesson's distribution center in Atlanta," says Douglas Thompson, vice-president of distribution services at McKesson.

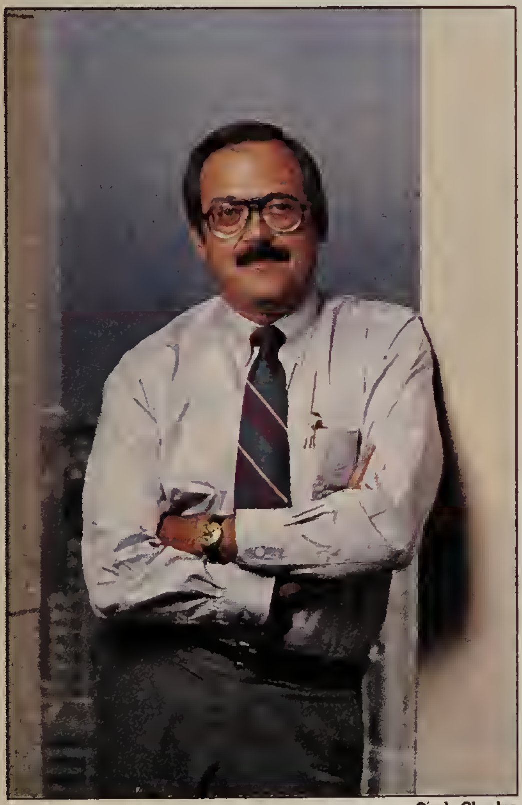
"We will have created picking documents and unique retail price stickers for his order. And we will commence filling that order at 9 p.m. Atlanta time and have it into the store between noon and 3 p.m. the following day."

Thompson says that more than 99% of all the orders that McKesson processes in its distribution centers have been sent via a remote order entry terminal in the retail pharmacy. Pharmacies place orders either by entering the item identification and quantity required into a terminal, or by scanning product bar-code labels in their store to accumulate an order as they sell products. They then transmit that order via modem by dialing an 800 number that connects them to McKesson's mainframe.

Going it on their own

Some of the company's large accounts maintain their own warehouses. In such cases, McKesson's Rancho Cordova computers are linked to customer warehouse computers for direct transmission of orders. The company also accepts orders from customers that use point-of-sale (POS) terminals.

At the company's hub data center in Rancho Cordova, systems collect the data and then update pricing and inventory. Next, orders are segregated geographically and transmitted via satellite to one of McKesson's 43 regional distribution centers, where the orders are processed to create picking documents and retail price stickers specifically tailored to the individual store's requirements.



Cindy Charles

McKesson's Thompson *is on time*

Just a few hours after Rancho Cordova receives a customer's order, the distribution center will have received it, picked the order and loaded it onto a truck for delivery the next day.

Updates on all of the day's activities occur automatically, and a machine begins to generate accounts receivables.

Like McKesson, Bergen Brunswig has instituted just-in-time delivery, but the company is also experimenting with automating the picking and sorting of customer orders at the warehouse — traditionally one of the most labor-intensive operations for both manufacturers and distributors.

Bergen Brunswig recently automated partial case picking in its Valencia, Calif., distribution center after it discovered that 2,500 items out of its stock of 25,000 represented 50% of the company's order volume.

While it's more common for companies to automate the picking of full cases or pallets of products, more than 95% of the orders placed with Bergen Brunswig's drug distribution centers ask for less than a full case of a particular item. The Valencia distribution center was particularly ripe for automation because it is three times the size of the company's other distribution centers.

The center now features a fully automated picking system manufactured for Bergen Brunswig by ESD Corp. in San Jose, Calif.

Bergen Brunswig receives all orders in Valencia via an IBM Series/1 minicomputer, which polls customers for orders, accumulates them in batches and then forwards them to local IBM System/36s. From there the System/36s process the orders and send them electronically to a Hewlett-Packard Co. HP 1000, which controls the picking machine.

Location, location, location

The system creates pricing labels and order picking documents that tell employees where items are located in the warehouse, which items the automated picking machine is handling and which are in the company's controlled substance drug cage. It then routes the orders slated for automated picking to the HP 1000.

Bergen Brunswig can process three times as many orders as was previously possible and uses one-third fewer pickers.

"We are now able to get orders out for 900 to 1,000 customers in six to seven hours of working time," Hale says.

"The objective of such systems is to eliminate handling. Every time you touch stock, it costs you money," Management Dynamics' Seber says. And the cost savings can be dramatic. "Companies have saved as much as 40% to 50% of their labor costs" with picking systems, he asserts.

Another way distributors and manufacturers are taking time out of the supply loop is by placing orders to their own suppliers using electronic data interchange (EDI), a method of electronically exchanging documents. Bergen Brunswig's Hale estimates that 88% of his company's supply-purchasing dollars are handled through automated EDI transactions. "Approximately the top 125 of our 500 suppliers are on automated purchasing," Hale says.

Bergen Brunswig's automated purchasing system revolves around an IBM 3090 at company headquarters in Orange, Calif. The 3090 operates as a real-time inventory machine, continuously monitoring the Application System/400s and System/36s at 32 drug distribution centers across the country.

"The 3090 interfaces with every one of the divisions," Hale says. "It's continuously being updated with receipts and shipments so at any one time it's very close — within an hour — to what's really happening at all of our shipping and receiving docks."

The company monitors shipping and deliveries at its distribution centers, analyzes the quantity of items on hand at each facility and compares that to the theoretical demand based on an analysis of historical data. The inventory software figures out the lead time that each manufacturer needs to deliver an item and uses that information to calculate how much of a particular product Bergen Brunswig needs for each facility and precisely when those orders have to go out.

Luc Novovitch/Gamma-Liaison

Management Dynamics' Seber *focuses on inventory*

Inventory cost reductions and improved customer service are immediate benefits of automating distribution. But integrated distribution systems have a long-term strategic value.

Eventually, as the systems become established, corporations can draw upon valuable on-line historical data for better sales forecasting and promotions management. This will enable them to go beyond product histories to determine why the forecast was inaccurate or how successful a promotion was. Since automated distribution systems are relatively new, most companies now lack the depth of on-line historical data necessary for spotting trends and making projections. "Because companies can't easily access the information that captures all the costs involved, they don't have the vehicle for doing a postmortem analysis," Seber says.

The first step toward generating enough historical data to make projections that will be meaningful is to integrate logistics into the IS network.

Fiderio is a free-lance writer based in Gilsum, N.H.

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When a bank is more than a bank

'Any to any using many' is Chase Manhattan's motto

INTEGRATING
MULTIPLE
VENDORS:
Chase
Manhattan
Bank

BY ANN DOOLEY
CW STAFF

Banks don't deal in just money anymore. They leverage information and customer service to compete in an increasingly cutthroat financial environment.

With that in mind, Chase Manhattan Bank NA last year began investigating ways to sharpen its competitive edge. "Attracting clients through better customer service means the ability to gather, react to and effectively communicate the best information possible in a very fast-pace and global market," says Jim Whelan, vice-president of integrated office systems at Chase. According to Whelan, customer service means information, which means communications technology.

To achieve this goal, Chase developed a global network infrastructure, connecting more than 100 multivendor nodes worldwide into one electronic mail information network.

"Any to any using many" became Chase's motto.

Chase is a highly decentralized organization but one that needs to communicate almost continuously across time zones and with little delay. Not only were different systems installed in each of its offices throughout the world, but different departments were also using their own computer systems, steadfastly maintaining that these fit their needs like no other. "That's what we had to face," Whelan explains.

Chase had been using E-mail for a number of years on its administrative systems. In early 1989, the bank had 180 Wang Office Information Systems worldwide, interconnected by Wang's Mailway E-mail product and limited to document transfer. It also had in place a central Digital Equipment Corp. All-In-1 network and various IBM systems, including the vendor's Professional Office System.

Additionally, any number of Banyan Systems, Inc., 3Com Corp. and other networking products were tucked away in departments throughout the world, according to Whelan.

People just weren't using E-mail when it was on a system apart from their departmental computer systems, Whelan says.

The first step was to market the idea of E-mail, a lesson he had previously learned. The first time Whelan attempted to install a system of this magnitude, he was turned down by top management because, he notes, "I didn't explain the strategic advantages clearly enough."

This time, however, he won management support precisely because he was able to sell them on integrated E-mail's benefits.

As Whelan envisioned it, the major benefits of the system would include business communications across time zones, the elimination of telephone tag, message-receipt verification and the ability to share data seamlessly within the bank as well as with users outside Chase.

Winning departmental support hinged on a monetary sticking point — chargebacks. Once corporate agreed to pay for the charges, departments bought into the system. Now nearly everyone is convinced it's a corporate asset, Whelan says.

The stage was set. In June 1989, Whelan implemented Softswitch, Inc.'s E-mail translation product, which enables all three Chase proprietary systems to connect with one another as well as with the various Banyan and 3Com local-area networks consisting of nearly 600 stations.

More than 7,000 users were using the integrated E-mail system after three months, and by the end of 1990, Whelan's goal is for all of Chase's professionals and managers — some 20,000 users — to be on the system.

Real-time talk

By using Softswitch's X.400 gateway and interconnecting with MCI Communications Corp.'s MCI Mail, Chase can communicate real-time information on markets or specific financial accounts to customer mailboxes all over the world. For example, Chase can provide a customer the current financial data on a specific program from its Hong Kong office or merge databases on two or more Chase financial programs in which the customer is participating. This kind of "deal doing" was not possible previously.

Whelan believes Chase is the first bank to use MCI Mail in this manner and thinks it offers an advantage because information can be distributed instantaneously to any number of E-mail users, whereas paper facsimile is distributed individually. Additionally, a message can be verified as received, which makes the process more secure than using a fax.

Andy Freeberg

Chase's Whelan *says customer service means information*

E-mail has become critical to Chase, but what is even more important, according to Whelan, is that the technology has created an integrated and unified infrastructure, which in turn can help create new products and services.

Advanced information delivery and information access will allow customers to get at information about products as never before. Currently, there is no one repository at Chase where customers can access the more than 5,000 products and services the bank offers globally, let alone find out who is in charge of them.

The ability to provide this kind of value-added service through the infrastructure is a major asset for the bank — and an asset that's going to be expanded upon in the '90s, Whelan predicts. "We can now really begin to deliver specialized and timely information internally and to our customers and we're just breaking the surface," Whelan notes.

E-mail everywhere?

Chase is also extending its E-mail system to other Chase-owned banks and plans to eventually offer it to a variety of its customers and business partners. For now, Chase Manhattan and Chase Lincoln First, a wholly owned subsidiary, are communicating through IBM's Information Network linkup. According to Jim Vitale, vice-president of MIS at Chase Lincoln, a major benefit will be to provide Chase Lincoln access to information anywhere on the network. "It gives our customers quick information [access] to Chase's services and points of information," Vitale says.

Whelan is attempting to get each business unit to make certain standards decisions. Right now, "you name it, we use it," he says. Whelan's goal for the '90s is to reduce the number of Chase's architectures.

Vendors are going to have to help, Whelan admits. "I want to reduce the variables we're forced to deal with today by standardizing on certain architectures. As long as the vendors support that architecture transparently, it doesn't matter how many vendors we use," he says. This way, Chase can maintain its multivendor environment, and the user departments will never even know it.

That scenario is not possible right now, and getting to that point will be a gradual process during the next three years as standards become better defined, Whelan says. The three-year mark is especially important because the bank is building a new office for 6,000 New York employees that will be finished in 1992. Whelan is currently working with departments to find out their needs and how they can best be met. Some decisions have been made, however: The new office will implement a token-ring network based on IBM's OS/2 LAN Server with Officevision.

"We anticipate big changes in the next three years — better communications flow, new products, a more transparent system and a new evolution of our multivendor environment through standards," Whelan predicts. "And, of course, keeping ahead of the competition through technology."

Dooley is *Computerworld's* editor, integration strategies.

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Steely determination: Ingersoll forges a flexible strategy

Manufacturing giant's technology-oriented culture embraces CIM, expert systems

INTEGRATING THE ORGANIZATION:
Ingersoll Milling Machine

BY PAUL GILLIN
CW STAFF

The company builds the largest machines of their kind, but it's tiny bits of information that make Ingersoll Milling Machine Co. the envy of its industry.

Ingersoll's machining lines and metal milling products, some examples of which stand up to three stories high, turn hunks of steel into things like automobile engine blocks, turbine housings and molds for glass television screens.

You can pick just about any computerized manufacturing technology that comes to mind, and it's probably used at Ingersoll. Computer-integrated manufacturing (CIM), the dauntingly complex technology of getting factory lines to turn out products at optimum speeds with minimum waste or inventory, has been used in some capacity since 1974. Flexible manufacturing systems are used to mill small machine parts in lots of one with virtually instant retooling. Numerical control systems are almost eliminating the human error factor in cutting blocks of steel into complex machine parts. And Ingersoll is well into a pilot project to fold expert systems into its operations.

The driving force behind it all is a technology-oriented corporate culture and the nature of its business. Most of Ingersoll's work is built only once, sometimes while the customer is still designing it. "We're really an engineering firm," says George Hess, Ingersoll's vice-president of systems and planning. As a result, the company puts a premium on flexibility.

Helping it stay flexible is Ingersoll's unusually high level of manufacturing integration. Its diverse operations use a common database, and a computer schedules each day's activities on the company's 785,000 square feet of shop floor. A 42 million instruction per second Hitachi Data Systems, Inc. (HDS) XL-80 mainframe drives the whole operation, with links between engineers on Ingersoll's 217 computer-aided design and manufacturing (CAD/CAM) terminals and such functions as purchasing, billing, order handling, payroll and even the machines on the shop floor. For example:

- An engineer can create a drawing for a custom machine tool on IBM's Cadam software and simultaneously specify what parts will be needed to build it. The system consults the database, automatically cuts purchase orders for whatever parts the company needs to buy and schedules shop time to build the parts that need to be custom-milled. The system ensures that the parts come together at the right time to minimize time spent sitting in inventory.
- An aggressive move into flexible manufacturing has put wire-guided vehicles into the so-called light machining area, where smaller parts are made. The vehicles shuffle pallets back and forth onto the milling machines and bide their time while the chunks of steel are shaved and drilled into finished machine parts. The whole process is managed by Digital Equipment Corp. VAX minicomputers linked to the HDS mainframe, using instructions supplied by numerical control engineers. Humans are needed only to lock the raw steel castings into position. The procedure is "twice as productive and four times as accurate" as the manual process it replaced, says Lute Wyttenbach, Ingersoll's manager of numerical control.
- A computerized "nesting" system determines the most efficient way to carve raw plates of steel into the pieces needed for the finished machinery. By automating this process, which used to be planned with paper and scissors, Ingersoll reduced manpower requirements on its torch cutting machine by 90%. More importantly, the system is linked into the bill-of-material, routing, payroll, cost and master scheduling systems, minimizing the amount of time finished steel shapes are held in inventory.

Courtesy Hitachi Data Systems

> "IN THE 1970s, [Ingersoll Chairman and Chief Executive Officer Edson] Gaylord came to each department head and asked what we needed to compete not in the 1980s, but in the 1990s."
>
> GEORGE HESS
> INGERSOLL

Innovations like these have garnered a closetful of manufacturing awards for Ingersoll in a segment of the market now known for computerization.

Sterling reputation

Times weren't always so good, but Ingersoll's technological stamina and its tradition of fiercely private ownership enabled it to weather the storms of American heavy industry in good shape. "They're one of the most highly respected machine tool makers in the world," says Gary Vasilash, editor of *Production* magazine. "The stuff they produce is world class."

Because orders are so large — a single machine can cost more than $6 million and a whole system more than $30 million and take up to two years to design and build — and subject to the ups and downs of the heavy manufacturing industry, Ingersoll has had its share of financial hard times. In the mid-'80s, when the farm equipment industry was in the dumps, Ingersoll borrowed money to keep afloat with minimal layoffs.

The company has also faced aggressive competition from overseas companies, which have increased their dollar market share in milling machine tools from 29% in 1983 to 40% in 1988, according to government figures.

But Ingersoll has kept retooling through the highs and lows, and today officials say the backlog of work is larger than ever. Employing 4,500 people at plants in Rockford, Ill., and West Germany, Ingersoll has a $450 million share of the $5 billion machine tools market. It is the 12th largest machine tools maker in the U.S., according to *American Machinist* magazine.

At the core of that success is the technology focus that exists within

Continued on page 83

Gillin is *Computerworld's* executive editor.

CORNER OFFICE

Robert Morison

Integrating for the future

Although computers have improved the work of individual functions within corporations, sometimes dramatically, many of these automated processes and procedures are themselves becoming impediments to achieving the competitive mandates of the '90s.

Currently, most companies are organized for the past, not the future. Decades ago, business functions were pulled apart to make them more manageable. But the complicated, fragmented structures that resulted are now interfering with business goals — pursuing new opportunities quickly, for example, or tightly managing key facets of the business. What's needed is integration of a new kind.

The reconstructed organization will reflect a common purpose, not the cross-purposes and conflicting motivations of a company splintered into distant departments. The organization will be able to be responsive to customer demands, rather than let them fall between the cracks because "it's not my job." The organization will be results-oriented rather than task-oriented.

All of these shifts carry large information components. For example, without consistent, up-to-date information flowing back from the field, no one in the organization can understand customer needs or respond to them. A well-updated database with broad, shared access might be in order. If customer feedback were tracked and communicated via information systems, staff might be able to make the transition from a task orientation to a results orientation.

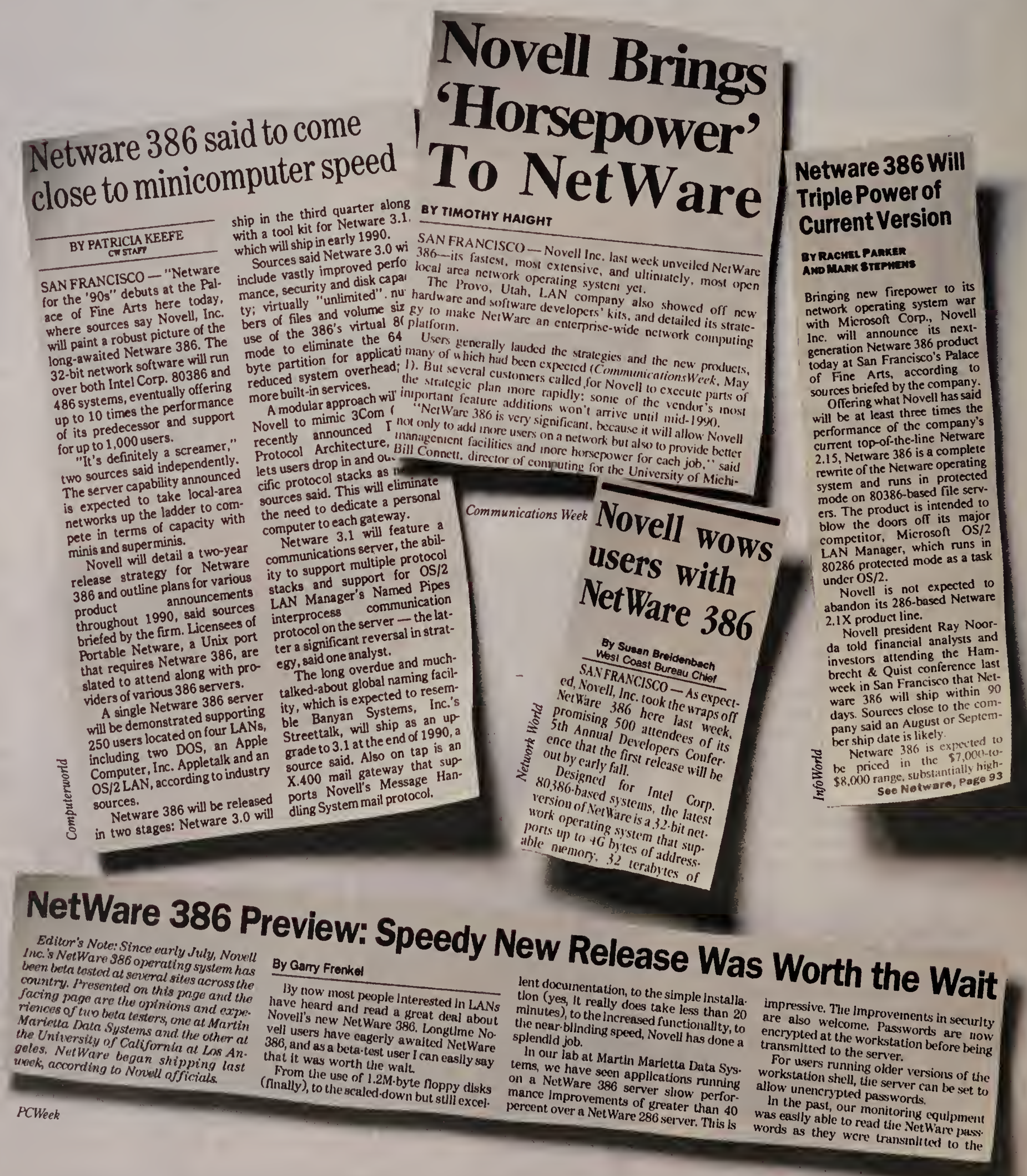
Thus, information systems officers must be deeply involved in this type of cross-functional integration.

Getting started

Ideas for the integrated organization may stem from "symptoms," conditions present inside the corporation. To pinpoint potentially high payoff areas, look for the following symptoms:

- **Long sequential processes that don't offer enough feedback.** For example, the sequence that links the purchasing, receiving, accounts payable, inventory and production areas often operates without giving adequate feedback to each group on a part's quality and usage rates. A cross-functional information system could provide better information for each group in the process, allowing closer coordination, lower inventory levels and a coherently managed process.
- **Processes with too much validity checking.** The dispatching department should not be double-checking every shipment for validity and priority, for example. Doing so both slows down the process and reflects a breakdown in communications and working relationships.
- **Intensive, repetitive information exchange.** If information is continually passed back and forth between two functions, investigate whether that information should be shared.
- **Numerous people dealing with the same customer or supplier.** In this case, a company forfeits opportunities for scale purchasing and leverage in regard to suppliers. Likewise, it is ignoring the potential for tailored customer service and other external relationships.
- **High levels of inventories or other assets.** Such buffers or safety valves signal a weakness in the information used to coordinate activities and manage asset levels.
- **Continual use of ad hoc organizational structures.** After a point, task forces, matrices, coordinators, liaisons and expediters cannot be relied on

Continued on page 88



NetWare® 386 makes it easy

Netware 386 said to come close to minicomputer speed

BY PATRICIA KEEFE
CW STAFF

SAN FRANCISCO — "Netware for the '90s" debuts at the Palace of Fine Arts here today, where sources say Novell, Inc. will paint a robust picture of the long-awaited Netware 386. The 32-bit network software will run over both Intel Corp. 80386 and 486 systems, eventually offering up to 10 times the performance of its predecessor and support for up to 1,000 users.

"It's definitely a screamer," two sources said independently. The server capability announced is expected to take local-area networks up the ladder to compete in terms of capacity with minis and superminis.

Novell will detail a two-year release strategy for Netware 386 and outline plans for various product announcements throughout 1990, said sources briefed by the firm. Licensees of Portable Netware, a Unix port that requires Netware 386, are slated to attend along with providers of various 386 servers.

A single Netware 386 server will be demonstrated supporting 250 users located on four LANs, including two DOS, an Apple Computer, Inc. Appletalk and an OS/2 LAN, according to industry sources.

Netware 386 will be released in two stages: Netware 3.0 will ship in the third quarter along with a tool kit for Netware 3.1, which will ship in early 1990.

Sources said Netware 3.0 wi include vastly improved perfo mance, security and disk capa ty; virtually "unlimited". nu bers of files and volume siz use of the 386's virtual 8(mode to eliminate the 64 byte partition for applicati reduced system overhead; more built-in services.

A modular approach wil Novell to mimic 3Com (recently announced T Protocol Architecture, lets users drop in and ou cific protocol stacks as n sources said. This will eliminate the need to dedicate a personal computer to each gateway.

Netware 3.1 will feature a communications server, the ability to support multiple protocol stacks and support for OS/2 LAN Manager's Named Pipes interprocess communication protocol on the server — the latter a significant reversal in strategy, said one analyst.

The long overdue and much-talked-about global naming facility, which is expected to resemble Banyan Systems, Inc.'s Streettalk, will ship as an upgrade to 3.1 at the end of 1990, a source said. Also on tap is an X.400 mail gateway that supports Novell's Message Handling System mail protocol.

Computerworld

Novell Brings 'Horsepower' To NetWare

BY TIMOTHY HAIGHT

SAN FRANCISCO — Novell Inc. last week unveiled NetWare 386—its fastest, most extensive, and ultimately, most open local area network operating system yet.

The Provo, Utah, LAN company also showed off new hardware and software developers' kits, and detailed its strategy to make NetWare an enterprise-wide network computing platform.

Users generally lauded the strategies and the new products, many of which had been expected (*CommunicationsWeek*, May 1). But several customers called for Novell to execute parts of the strategic plan more rapidly: some of the vendor's most important feature additions won't arrive until mid-1990.

"NetWare 386 is very significant, because it will allow Novell not only to add more users on a network but also to provide better management facilities and more horsepower for each job," said Bill Connett, director of computing for the University of Michi-

Communications Week

Netware 386 Will Triple Power of Current Version

BY RACHEL PARKER
AND MARK STEPHENS

Bringing new firepower to its network operating system war with Microsoft Corp., Novell Inc. will announce its next-generation Netware 386 product today at San Francisco's Palace of Fine Arts, according to sources briefed by the company.

Offering what Novell has said will be at least three times the performance of the company's current top-of-the-line Netware 2.15, Netware 386 is a complete rewrite of the Netware operating system and runs in protected mode on 80386-based file servers. The product is intended to blow the doors off its major competitor, Microsoft OS/2 LAN Manager, which runs in 80286 protected mode as a task under OS/2.

Novell is not expected to abandon its 286-based Netware 2.1X product line.

Novell president Ray Noorda told financial analysts and investors attending the Hambrecht & Quist conference last week in San Francisco that Netware 386 will ship within 90 days. Sources close to the company said an August or September ship date is likely.

Netware 386 is expected to be priced in the $7,000-to-$8,000 range, substantially high-

See Netware, Page 93

InfoWorld

Novell wows users with NetWare 386

By Susan Breidenbach
West Coast Bureau Chief

SAN FRANCISCO — As expected, Novell, Inc. took the wraps off NetWare 386 here last week, promising 500 attendees of its 5th Annual Developers Conference that the first release will be out by early fall.

Designed for Intel Corp. 80386-based systems, the latest version of NetWare is a 32-bit network operating system that supports up to 4G bytes of addressable memory, 32 terabytes of

Network World

NetWare 386 Preview: Speedy New Release Was Worth the Wait

Editor's Note: Since early July, Novell Inc.'s NetWare 386 operating system has been beta tested at several sites across the country. Presented on this page and the facing page are the opinions and experiences of two beta testers, one at Martin Marietta Data Systems and the other at the University of California at Los Angeles. NetWare began shipping last week, according to Novell officials.

By Garry Frenkel

By now most people interested in LANs have heard and read a great deal about Novell's new NetWare 386. Longtime Novell users have eagerly awaited NetWare 386, and as a beta-test user I can easily say that it was worth the wait.

From the use of 1.2M-byte floppy disks (finally), to the scaled-down but still excellent documentation, to the simple installation (yes, it really does take less than 20 minutes), to the increased functionality, to the near-blinding speed, Novell has done a splendid job.

In our lab at Martin Marietta Data Systems, we have seen applications running on a NetWare 386 server show performance improvements of greater than 40 percent over a NetWare 286 server. This is impressive. The improvements in security are also welcome. Passwords are now encrypted at the workstation before being transmitted to the server.

For users running older versions of the workstation shell, the server can be set to allow unencrypted passwords.

In the past, our monitoring equipment was easily able to read the NetWare passwords as they were transmitted to the

PCWeek

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Ingersoll

FROM PAGE 81

the company. "The whole culture of Ingersoll is that we're forever pushing the state of the art," says Stephen Lewis, vice-president of manufacturing at the company.

Hess attributes much of that attitude to Edson Ingersoll Gaylord, chairman and chief executive officer of the family-owned company. "In the 1970s, Gaylord came to each department head and asked what we needed to compete not in the 1980s, but in the 1990s," Hess says.

For IS, the answer was an integrated database. So in 1979, IS suspended all application development for two years while it melded a patchwork of 225 different file systems into a single database under IDMS, the database management system now sold by Computer Associates International, Inc.

When the system went live in 1980, the 1,300 applications within Ingersoll were virtually unchanged but were all sharing the same data. "Instead of the businesses controlling us, we were controlling the business," Hess says. Since then, Ingersoll has expanded its CIM system to what it is today, writing virtually everything internally.

Expert systems are spearheading Ingersoll's next IS move as the company leaves what Hess calls the "integration decade" of the '80s and enters the "optimization decade" of the 1990s. It has built a pilot expert systems application that captures expert knowl
parts purchasing.

Ingersoll is also in
Cimplex system to
advice to design and
Hess wants the syste
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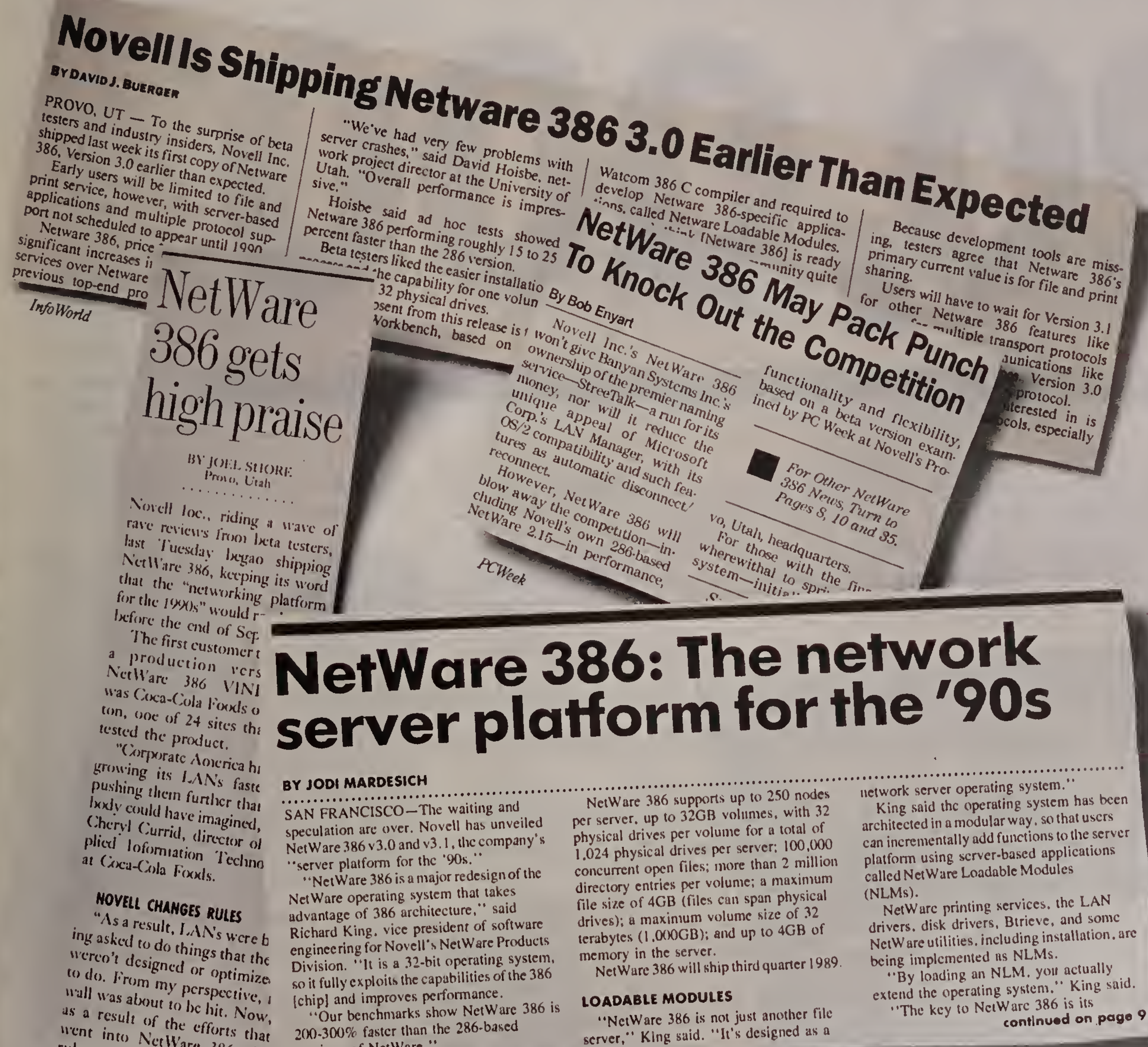

Novell Is Shipping Netware 386 3.0 Earlier Than Expected

BY DAVID J. BUERGER

PROVO, UT — To the surprise of beta testers and industry insiders, Novell Inc. shipped last week its first copy of Netware 386, Version 3.0 earlier than expected.

Early users will be limited to file and print service, however, with server-based applications and multiple protocol support not scheduled to appear until 1990

Netware 386, price
significant increases i
services over Netware
previous top-end pro

"We've had very few problems with server crashes," said David Hoisbe, network project director at the University of Utah. "Overall performance is impressive."

Hoisbe said ad hoc tests showed Netware 386 performing roughly 15 to 25 percent faster than the 286 version.

Beta testers liked the easier installatio
the capability for one volun
32 physical drives.
sent from this release is
Workbench, based on

Watcom 386 C compiler and required to develop Netware 386-specific applications, called Netware Loadable Modules.
[Netware 386] is ready
unity quite

Because development tools are missing, testers agree that Netware 386's primary current value is for file and print sharing.

Users will have to wait for Version 3.1 for other Netware 386 features like
multiple transport protocols
unications like
Version 3.0
protocol.
terested in is
cols, especially

InfoWorld

NetWare 386 May Pack Punch To Knock Out the Competition

By Bob Enyart

Novell Inc.'s NetWare 386 won't give Banyan Systems Inc.'s ownership of the premier naming service—StreeTalk—a run for its money, nor will it reduce the unique appeal of Microsoft Corp.'s LAN Manager, with its OS/2 compatibility and such features as automatic disconnect/reconnect.

However, NetWare 386 will blow away the competition—including Novell's own 286-based NetWare 2.15—in performance,

functionality and flexibility, based on a beta version examined by PC Week at Novell's Provo, Utah, headquarters.

For those with the fin
wherewithal to spri
system—initia

For Other NetWare 386 News, Turn to Pages 8, 10 and 35.

PCWeek

NetWare 386 gets high praise

BY JOEL SHORE
Provo, Utah

Novell Inc., riding a wave of rave reviews from beta testers, last Tuesday began shipping NetWare 386, keeping its word that the "networking platform for the 1990s" would r
before the end of Sep

The first customer t
a production vers
NetWare 386 VINI
was Coca-Cola Foods o
ton, one of 24 sites th
tested the product.

"Corporate America h
growing its LANs fast
pushing them further tha
body could have imagined,
Cheryl Currid, director of
plied Information Techno
at Coca-Cola Foods.

NOVELL CHANGES RULES

"As a result, LANs were b
ing asked to do things that the
weren't designed or optimize
to do. From my perspective,
wall was about to be hit. Now, as a result of the efforts that went into NetWare 386, the rules and the limitations of the network game have just changed. Novell has pushed the wall back," said Currid.

As part of its development program, the product underwent vigorous beta testing at 24 sites, including United Parcel Service, Martin Marietta Corp., Southern California Edison and Oregon State University.

"Comments from our [beta]

Computer Reseller News

NetWare 386: The network server platform for the '90s

BY JODI MARDESICH

SAN FRANCISCO—The waiting and speculation are over. Novell has unveiled NetWare 386 v3.0 and v3.1, the company's "server platform for the '90s."

"NetWare 386 is a major redesign of the NetWare operating system that takes advantage of 386 architecture," said Richard King, vice president of software engineering for Novell's NetWare Products Division. "It is a 32-bit operating system, so it fully exploits the capabilities of the 386 [chip] and improves performance.

"Our benchmarks show NetWare 386 is 200-300% faster than the 286-based versions of NetWare."

NetWare 386 supports up to 250 nodes per server, up to 32GB volumes, with 32 physical drives per volume for a total of 1,024 physical drives per server; 100,000 concurrent open files; more than 2 million directory entries per volume; a maximum file size of 4GB (files can span physical drives); a maximum volume size of 32 terabytes (1,000GB); and up to 4GB of memory in the server.

NetWare 386 will ship third quarter 1989.

LOADABLE MODULES

"NetWare 386 is not just another file server," King said. "It's designed as a network server operating system."

King said the operating system has been architected in a modular way, so that users can incrementally add functions to the server platform using server-based applications called NetWare Loadable Modules (NLMs).

NetWare printing services, the LAN drivers, disk drivers, Btrieve, and some NetWare utilities, including installation, are being implemented as NLMs.

"By loading an NLM, you actually extend the operating system," King said. "The key to NetWare 386 is its

continued on page 9

LAN TIMES

NOVELL

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"When one
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time," explains
Hess, Ingersoll
president of syst
planning.

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has alternated
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last 15 years — al
good price.

Secondhand sc

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Hess says. "Wh
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On SQL Server's tied trail
NAS deal brings new lineup to plug compatible market
Chip prices drop; PC prices don't

Eastern Europe move expands UPS horizons

INTEGRATING NETWORKS:

United Parcel Service

BY JOSEPH MAGLITTA
CW STAFF

Early this year, a new sight quietly appeared on the streets of Moscow, Budapest, East Berlin and Warsaw. Brown-uniformed drivers in shiny brown trucks from United Parcel Service (UPS) zipped through local traffic, dropping off parcels and documents at city businesses. Package delivery, Western-style, had arrived in the Eastern Bloc.

Announced in December, the Eastern European venture is the latest UPS foray in a technology-driven global expansion that began in 1987 and turned red-hot last year.

During the past 15 months alone, UPS has acquired nine foreign air transport companies, built the nation's 10th-largest airline and added 130 countries to its service area.

This kind of pedal-to-the-metal expansion means that UPS' information systems staff spends quite a bit of time these days thinking about the best ways to integrate networks, business goals, customers and employees.

Andy Freeberg

Erbrick *guides IS explosion at UPS*

"It's been kind of hectic," says Frank Erbrick, senior vice-president of UPS Information Services, based in Paramus, N.J. Catching his breath during a recent visit by the Soviet Union's minister of transportation, Erbrick adds that the fast pace energizes him and the IS staff. "Excitement breeds excitement," agrees Rino Bergonzi, UPS manager of applications and operations. "They love it."

Over the last two years, wildfire expansion and aggressive use of local- and wide-area networks, personal computers and other technologies has helped the Greenwich, Conn.-based firm grow from a mostly domestic parcel carrier into a $12 billion international giant. Each day, UPS delivers an average of 12 million packages and documents (or around 2.8 billion per year) to 180 countries and territories, making it the world's largest package delivery company.

Even so, analysts say UPS won't dominate world shipping as easily as it has ruled land delivery in the U.S.

"There's no question they have the will," says Craig Kloner, a freight and shipping analyst at New York investor Goldman, Sachs & Co. But he says that freight forwarders, small shippers, Federal Express and others will present a strong overseas challenge for UPS.

Kloner adds that although UPS has been "extremely profitable" in recent years, it must overcome a historical reputation for weak technology usage.

Handling routine daily activities at UPS is an awesome IS task. Today's global operation bears little resemblance to the tiny messenger firm begun in 1907. At present, the company boasts a fleet of 103,000 vehicles, 354 jets, 230,000 employees and 1,750 facilities worldwide. Brown-clad UPS drivers are recognized from Cairo, Ga., to Cairo, Egypt, and nearly everywhere in between.

And where UPS goes, its networks and computers go, so there is no shortage of integration opportunities at the company these days.

Expanding the web

Many new projects at UPS involve building or expanding the company's gargantuan web of WANs and Novell token-ring LANs (which now number more than 300).

Other projects support a corporatewide shift from centralized IBM minis and mainframes to a client/server architecture with distributed PCs or address-specific applications.

A few examples:

Maglitta is a *Computerworld* senior editor, in depth.

Thinking Laptop PC's?

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- **Expansion of the International Shipments Processing System, or ISPS.** Described by the company as the transport industry's most advanced computerized system, ISPS is the nerve center for international growth.

The system processes and tracks parcels moving in and out of every country in the UPS network. It handles customs documentation and automatic billing and can alert import locations hours before a package arrives.

Using leased and dial-up lines as well as satellites, ISPS can zip data around the world in 2.1 seconds.

ISPS can be installed in any country or city in the world. In Eastern Europe, ISPS will be brought in on a PC when shipping volume increases later this year.

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>
> FRANK ERBRICK
> UNITED PARCEL SERVICE

- **Advanced Label Imaging System.** Introduced last November before the Christmas rush, ALIS was designed to streamline air package tracking. The PC-based imaging system captures and processes data from UPS air labels and delivers an on-line image via high-speed phone lines to UPS mainframes in Paramus.
- **Computer-to computer communications with customs.** Using ISPS, UPS has pioneered computer-to-computer communications with customs agencies in the U.S., Canada and Puerto Rico. The company is now working on similar deals with France, England and West Germany.
- **Expanding EDI.** Electronic data interchange plays a big part in integrating UPS customers, Bergonzi says. All told, 40,000 customers now use UPS EDI. Some 300 dial directly into UPS' system and do their own billing and package tracking. "To be a progressive organization — to provide value-added service to a customer — you have to do more in EDI in the 1990s," he says.
- **Downsizing.** In 1989, UPS replaced 93 IBM 8100 minicomputers with LANs and LAN-based gateways using Gateway Communications' 3270/RJE product for host communications. More such downsizing is expected to follow.
- **Shift to PCs.** Late last month, UPS took another big step toward distributing MIPS to users around the world. On Jan. 30, AT&T announced a $29 million pact for "several thousand" 386-based PCs for UPS' network of package distribution centers and central information processing operations.

Some 1,700 systems have already been delivered; the remainder will arrive during the next 12 months, bringing the number of UPS PCs worldwide to around 20,000, Erbrick says.

- **LAN-to-LAN backbone.** Individual LANs are being linked with 16M bit/sec. token-ring hardware and fiber-optic cable. This will permit users to share data, peripherals and electronic mail through large buildings. The local backbone is being linked with UPSnet, the company's proprietary international network.
- **UPSnet.** The ongoing expansion of UPSnet is the largest networking project of all. Begun last year, the wide-area backbone network is designed to let UPS send voice, data, facsimile, video and still images around the world using T1 lines.

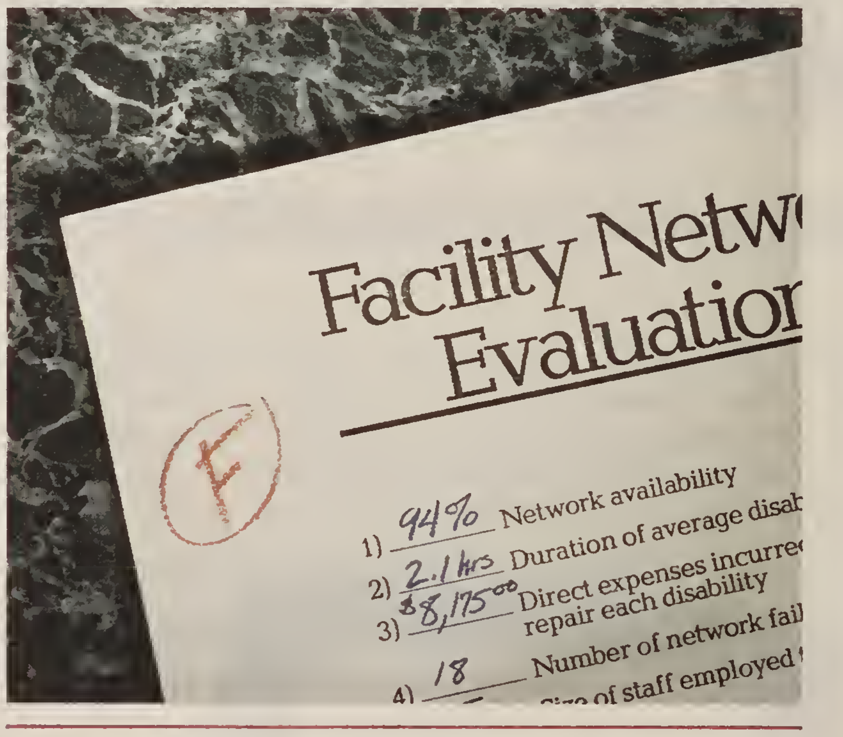
Three high-speed dedicated lines connect UPSnet to key Western European cities and local telephone companies.

Bergonzi estimates that the backbone will be about 50% installed by the end of 1990 and that some 30 or 40 U.S. distribution centers will be tied in.

Five-year plan key

Guiding the various UPS integration efforts is a five-year, $1.5 billion technology plan. Among other things, it calls for robotics, imaging, handheld computers, fax

In networking, we think 94% is a failing grade.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Everybody in, or else

To guarantee that IS can handle integration projects quickly, Frank Erbrick has laid down some tough rules for internal UPS customers. "We demand — and it's a matter of policy — that we won't work on a project unless the user community puts people on that project team full-time. We don't do it," he says.

Departments are expected to commit high-level people — often vice-presidents — and to assist in business and requirements analysis.

Matrix management ensures that IS stays tuned into business activities. IS staff is also assigned to UPS' business planning function. In one recent week, for example, IS planning managers were on special assignments developing national and international business plans.

JOSEPH MAGLITTA

and radio technologies — all in the context of a three-tier mainframe/mini/PC architecture.

The overall idea, Erbrick explains, is to get the best of both worlds: Give as much decentralized computing power as possible to end users while maintaining centralized IS control. "We are going to place as much work at the lowest level as we possibly can to gain function and productivity and still keep control centrally," Erbrick continues. "That's a critical issue."

A recent successful example: Replacing dumb data-entry terminals with 3,000 PCs yielded a 10% to 15% productivity improvement by eliminating the wait for mainframe time and giving users more processing power, Erbrick says.

How does UPS handle distributed computing in far-flung places where leased lines are not feasible and phone service might be shaky?

"When we decided to go heavily international, we took a version of [ISPS] and installed it on a PC," Bergonzi explains, "so people in remote locations are not dependent on communications lines — which sometimes are not the best in certain remote parts of the world — and aren't dependent on any mainframe if there is downtime."

If the volume is low, then the user can work on the PC and store-and-forward to a mainframe or other location, he says.

Keeping tabs

However, the distributed approach begs another question: How exactly do you control and track so many far-flung networks and systems? According to Bergonzi and Erbrick, you do it both organizationally and technologically.

Organizationally, IS uses a matrix management scheme it says is ideally suited to a fast-growing organization. An IS manager is assigned to each of 10 major business functions within UPS, such as automotive, international, customer service, human resources, finance and accounting, air and so on, Bergonzi says.

Managers then work with user representatives to define needs. It is then the IS manager's responsibility to keep track of the resultant project or system. Functional area managers are supported by centralized communications and other development personnel.

IS is centralized in five buildings in Paramus. These house two IBM 3090s, an IBM 3081 and an Amdahl Corp. 5990. The site acts as the main networking control hub. Technologically, servicing and protecting the complex web of networks is a huge undertaking, says Barry Lacy, a UPS manager who oversees field service, support, LANs and security.

Most LAN repairs, he explains, are decentralized. Approximately 500 trained service people in 15 regions and 75 districts use a UPS-developed expert system that performs many LAN diagnostics and troubleshooting. Technicians "actually have their little portable computer put symptoms in," Bergonzi says. "Typically, it tells them exactly what to do, what the problem is and how to repair it quickly."

Decentralizing network repairs lets technicians work more efficiently and reduces end-user frustration, he says. Also, a worldwide help desk in Paramus uses expert system technology to help employees and customers identify and fix hardware, software and network problems.

For repairs that cannot be handled locally, a national service center in Louisville, Ky., is responsible for configuring, distributing and repairing all hardware and software for LANs and PCs. Because it is located at the main UPS airport hub, officials say the center can provide replacement equipment to any site within 24 hours. In addition, diagnostic tools and switches built into in UPSnet tackle wide-area network problems.

Security is handled on a layered basis, Lacy says. At the lowest level, PCs are physically locked. On the network level, access codes and passwords are used for applications and communications.

UPS' rapid worldwide growth has caused information services to burst at the seams. Last June, the company broke ground on an $80 million computer and telecommunications center in Mahwah, N.J. The 400,000 sq-ft facility, situated on 39 acres, is set to open this summer. When completed, it will provide worldwide computer support for UPS operations and house 1,500 IS emloyees. More importantly, it will also serve as the firm's worldwide network control center.

> MANAGEMENT AT UPS is acutely aware that continued success depends on keeping IS workers motivated and involved.

Over the last four years, IS at UPS has grown from 125 employees to nearly 1,700 today. Management at the employee-owned firm is acutely aware that continued success depends on keeping IS workers motivated and involved.

"Information professionals are the last craftsmen," Erbrick says. "They take extraordinary pride in their product. If you can't manage and can't make jobs and a career attractive for people that care that much about their product, you should take a gun to the heads of their managers."

His philosophy for keeping employees integrated and happy? "Give people freedom but monitor them so that there is a discipline. If you allow them to ply their trade, it's remarkable what they can do. The best thing for me to do is stay the hell out and watch from the corner."

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Morison

CONTINUED FROM PAGE 82

to cover for organizational fragmentation.

- **A layer of paper shufflers.** The main function of a management layer should not be passing information between departments or summarizing it for the top brass when systems could be doing the work.
- **Unchecked data proliferation.** Specifically, duplicated or inconsistent information about customers, suppliers, products or transactions is a danger sign for the organization. A variation is capturing and entering the same data multiple times or in multiple locations.

All are signs that information — too much, too little, too late or with too little value added — is a major bottleneck to getting things done. Attacking any of these symptoms using information technology in an effort to rethink and reintegrate a corporation's functions offers the potential for dramatic results.

Unforeseen payoffs

Like many other large-scale analysis and systems-building projects, integrating an organization via information systems raises some unexpected problems but may also have unanticipated payoffs.

A commercial bank, for example, was considering an effort to build a unified database of customer information, which would be shared across departments such as lending, trust and the specialty investment units. One of its purposes was to provide consolidated information about customers (that is, total credit balances). IS put together a traditional cost/benefit analysis based on improved clerical efficiencies, data consistency and processing efficiencies. The project was rejected.

The vice-president of lending then commissioned a customer survey; on the basis of customer dissatisfaction with the level of service (the length of time it took to get a straightforward question answered), he was able to sell the project as a service necessity.

Six months after the last department came on-line, the database began to provide the platform for two new cross-functional initiatives: Top management requested an analysis of the bank's credit exposure by customer across all services, and it wanted a profit-and-loss picture for each of its customers.

As these applications were built, they had the added effect of centralizing responsibility for customer activities via "customer relationship managers." Future projects include product development, target marketing and merging some of the smaller investment departments whose customer bases overlap.

Another example comes from a manufacturing company with a 30-year-old plant that was feeling its age. The plant experienced the results of fragmentation along a number of lines: long production lead times, high inventory levels, poor coordination of engineering changes, duplicate and contradictory planning and control information and no coherent way of managing quality. The atmosphere was static: Union workers and plant managers were set in their ways.

The opportunity for improvement came in the form of a customer order that was so large, it promised a steady stream of business for a decade. Top management, in conjunction with plant managers, decided to seize the opportunity to make improvements.

THE MAIN FUNCTION of a management layer should not be passing information between departments or summarizing it for the top brass when systems could be doing the work.

With a top priority to reduce manufacturing time and cost quickly, the project team began by addressing the core manufacturing system. A key decision was made to use a software package — an off-the-shelf manufacturing resource planning system — to get a head start. The package the team chose had only a 70% fit but brought important additional benefits: It forced the company to rely on central databases and to use a consistent set of programming tools.

The need for IS to program was greatly reduced; therefore, its role became more consultative, suggesting ways to streamline business processes and beef up interfaces between functions and software modules. IS spent time helping departments revise their procedures, explore the implications of mutual interdependence and actively share their information.

Five years after it won the large customer, the company has seen solid sales planning and operating planning for the first time, and lead times are down by as much as a factor of 10. Project managers stress that the system itself is only partially responsible but that it provided a catalyst for basic improvements to business processes and an opportunity to break away from some of the inertia of an older plant. To make full use of the system, departments have to do more business process improvement.

Morison is a principal at Index Group, Inc., a Cambridge, Mass.-based management consulting firm specializing in information technology. He is also director of PRISM, a multiclient research program.

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PRODUCT SPOTLIGHT

PRINTERS and PLOTTERS

Careful what you wish for in the data center

BY ALAN RADDING

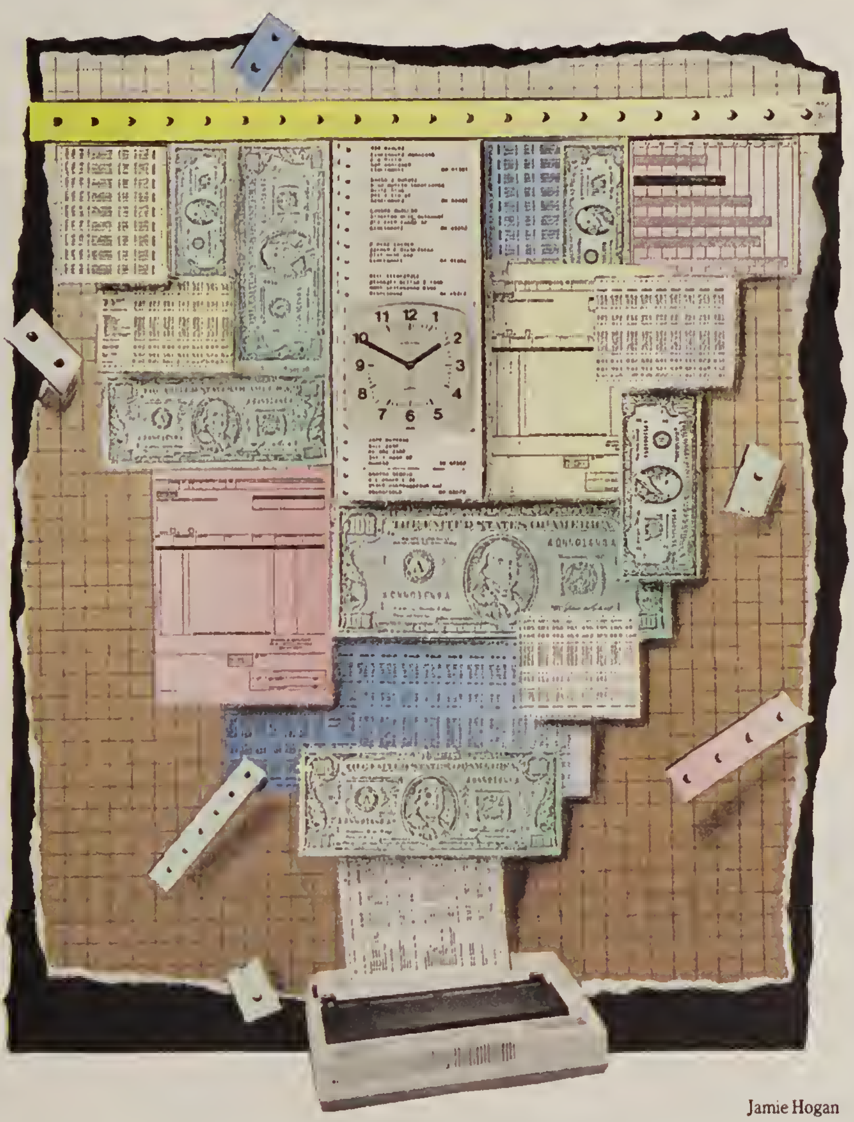
Variety is nice, but too many options can produce indigestion. That's as true for printers in the data center as it is for pizzas topped with "the works." When impact was the dominant focus, high-volume printer managers focused on hardware cost, the speed of the machine and the maintenance record of the manufacturer, says Bill Allen, product manager of laser printing at Bank of Boston. Today, users are demanding more of high-volume printers, and at the same time, nonimpact machines are presenting new options.

"There is a fascinating diversity of the technology" available to a printing manager for a major data center, according to Gerry Clarke, manager of output systems at Westinghouse Corporate Computer Services in Pittsburgh.

Managers can choose from a variety of volumes, ranging from 60 to 70 page/min. on the low end of the high-volume category to more than 200 and even 400 page/min. when printing duplex. Along with cut-sheet and continuous feed, there is also web feed, in which continuous sheet input comes out as cut-sheet.

In addition to laser printing, there is LED, ion deposition and magnetography. A plethora of peripheral devices for preprint and postprint processing and paper handling are becoming available.

Practical color capability is expected at any moment. Common page description languages such as Adobe Systems, Inc.'s Postscript and IBM's more robust Systems Application Architecture/Advanced Function Printing (AFP) are gaining acceptance, not to mention that prices on these high-volume nonimpact models offer much better price/performance ratios.



Jamie Hogan

With these new choices come new responsibilities as well as new concerns. While Allen is still concerned with throughput and cost, he must now also pay close attention to print quality, cost, consumption of paper and — maybe most important — the software demands imposed by nonimpact printers.

Dark shadows

In fact, consultants see a dark side to these high-volume nonimpact printers. "People buy one of these printers for the sizzle, for all the things that it can do. But three years later, they're still using it like it was a line printer. They didn't realize how difficult the software implementation was to get all these features," says Dennis Baker, vice-president of COPI, a Houston service bureau.

"Think about a small boy coming back from Florida with a tiny, baby lizard. After a while, it outgrows the little glass jar. Then it outgrows the tank. Then it outgrows the bathtub. Pretty quickly, you have to bring an alligator to the zoo or it will take over your entire house," says Romeyn Stevenson, a senior partner at A. D. Parker & Associates in Toronto.

The printer, he says, has the potential to become a multimillion-dollar alligator wreaking havoc throughout the unsuspecting organization.

However, if you approach your decision with full knowledge of the issues, you can keep that alligator at just the right size.

The question of impact or nonimpact technology is not the question the printer managers are currently wrestling with.

"It is almost a given that data centers will choose a nonimpact printer," says Tom Dunn, president of Dunn Technology in Vista, Calif. While impacts are still considered very cost-effective for internal use and are necessary for multipart forms, organizations are also opting for the flexibility of laser technology.

In fact, Michael McGee, a senior analyst at Dataquest, Inc., a market research firm in Boxboro, Mass., estimates that high-volume laser printer shipments increased about 10% in 1989 over 1988, while line printers decreased or, at best, held steady.

Lasers are even breaking into the territory of forms generation, previously held by impact technology. Because the printer generates the form electronically as it prints the data, alterations are easy to make.

Also, because blank paper rather than preprinted forms are used, there are fewer handling headaches and less waste, as when the preprinted forms become obsolete. However, preprinted forms are still required in some situations, such as when color is used.

The Vancouver Stock Exchange in British Columbia is one organization that recently made the switch from impact to laser. All night, every night, seven IBM impact printers generated 100 million lines per month, consuming 30 tons of paper. Altogether, there were 68 impact-printer forms.

"It was very labor-intensive and an unpleasant working environment. As a result, there were a lot of report distribution errors," says Brad Fletcher, senior product analyst at the exchange.

After a study, the information

INSIDE

Almost Gymnastics
Flexibility is key when departments share printers. Page 94.

Product Face-Off
Apple's 'true' Postscript printer vs. Newgen's clone. Page 96.

Twist in the Plot
The lines between printers and plotters are blurring. Page 104.

Radding is a free-lance writer based in Newton, Mass.

Data centers

FROM PREVIOUS PAGE

systems department decided to replace the impact printers with five IBM 90 page/min. machines. It hoped to get better service at a lower cost, particularly through the reduction in labor; relief during the peak overnight batch-processing period, which was filling the entire print window; reduced physical space requirements and improvements in the working environment; superior print quality; better paper and forms management through standardized form size (using plain paper); and better responsiveness to users (distribute month-end statements in three business days).

It worked. The exchange was able to standardize on paper size, find different methods of paper storage, shift forms design responsibility from application programmers to a specialized team and make major improvements in computer room operations. It also saw cost savings of $25,000 a month.

Beyond choosing nonimpact technology, the issues involved in selecting a printer vary with the organization and, especially, with the application. The first cut is usually made on the question of cut-sheet or continuous-feed paper.

With lights-out operation in mind, vendors are introducing more paper-handling features that reduce the amount of attendance required by the printer. For instance, they are adding multiple paper feeds and giant paper rolls.

However, printer operation is unlikely to reach the lights-out stage in the foreseeable future, if ever. One problem is that the paper must be handled on the outgoing end. Another problem is the nature of printing itself.

"It's still paper, and it still jams," COPI's Baker says.

The quest for automation is also reaching the postprocessing stage. In some mailing operations, machines automatically fold paper and insert it in envelopes. However, postprocessing devices in general are not practical except for a facility dedicated to a single operation. "If you're running a universal printing operation, you can't keep changing the [physical] setup" to accommodate the specific function's needs, Baker says.

These devices will primarily be marketed by third-party vendors for very specific applications, according to McGee.

The choice of ion deposition, LED and laser is usually a quality and reliability issue. According to Baker, ion deposition is the fastest technology and offers the least investment, but the quality is not very high. LED offers both quality and reliability. Laser technology generates more heat, has more moving parts and thus is more susceptible to breakdowns.

With a variety of sizes available, buyers need to analyze current and projected volume to decide how large a printer is required. In addition to total number of pages, it is also important to consider the number and variety of jobs and the periods of peak demand.

Networked options

In an age of networked users, remote and distributed printing are increasingly popular features. In the case of remote printing, output is directed to a smaller, local data center printer close to the user, eliminating the need for binding, packaging and shipping.

Distributed printing allows the user to review the material electronically on the workstation before selecting the pages to actually be printed. The goal is to reduce the number of pages being printed.

Type quality and graphics are also changing issues. Users who have grown accustomed to mixing text and graphics in their desktop output are demanding the same capabilities from large data center applications. "Mainframe printing is being pushed by the desktop," says Michael Weiss, president of MWA Consulting in Palo Alto, Calif.

In some cases, users know not what they demand. "They ask why can't we do this or that. Well, Postscript is wonderful, but [the processing it requires] will bring one of these printers to its knees. You can't afford to have a $500,000 printer running at 10 page/min.," Baker says.

In a Dataquest benchmark test, a laser printer rated at 90 to 100 page/min. dropped to 15 page/min. when running a graphics-intensive publishing application.

Software parade

Sorting out all of the hardware options may seem overwhelming. However, it is the software issue that looms as the thorniest problem — one that never came up when printers were turning out line format text only. In fact, observers agree that it is in choosing software — not the printer itself — that the worst purchasing mistakes occur.

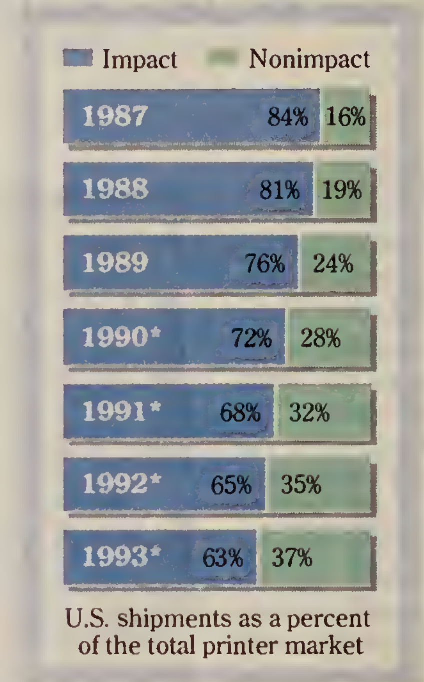
When it comes to line printers, programmers work from specially calibrated guides, encoding simple commands that move the text to some point on the page. Nonimpact printers, on the other hand, use complex page description languages (PDL) that require extensive programming in themselves. The decision to buy a nonimpact printer of this type is closely tied to the programming demands of the PDL, Stevenson says.

Also, because nonimpact printer vendors do not conform to a universal standard, "once you make a commitment in terms of software, it is not easy to change," says Kim Waechter, vice-president of United Micrographic Systems, a printing service bureau in Kansas City.

The key issue with software is "printer independence," Stevenson says, so that any job can be sent to any printer in the organization. Unfortunately, in most organizations, printer code is buried in each application, making it dependent on a certain printer. If the organization upgrades to a different printer, every printer call must be changed.

Still strong impact

While impact printers continue to outsell nonimpacts by a wide margin, the gap between the two is narrowing



U.S. shipments as a percent of the total printer market

*Projected

Source: International Data Corp.
CW Chart: Marie Haines

"There might be 200 to 300 write statements in an application, and each one must be reprogrammed," Stevenson says. For older applications with incomplete documentation, just finding those write statements can be a daunting challenge.

The ideal solution is to settle on a printer architecture that separates the printer commands from the data stream, Stevenson suggests. IBM's AFP is just such an approach. The AFP language is the emerging de facto standard for data center applications. It allows any true AFP document to be sent to any AFP-compatible printer.

Bank of Boston's Allen achieves a level of printer independence by sticking with IBM 3800 printers, a high-speed, on-line, continuous-sheet printer. "AFP is supported by the entire IBM family of printers, so it was never a problem," he says. As much as 70% of the bank's output uses AFP-generated electronic forms.

However, not every user is ready to embrace AFP. And switching to AFP or another vendor's PDL does not necessarily eliminate costly programming efforts. "We have one application with AFP. Once it is up and running, it does what it says, but it takes a massive effort to get it started," Westinghouse's Clarke says. In addition, Clarke says he finds AFP to be too difficult for end users.

The hardest part is recompiling, says Joseph Burke, former technical manager of electronic printing systems at Metropolitan Life Insurance Co. in New York. If you switch to AFP, your printer still has a form-specific name that must be called in the program, so "you have to go in and recompile thousands of applications."

Recompiling can be so daunting that it forces companies to limit their options to one vendor. At Blue Cross/Blue Shield of Massachusetts, analyst Raymond Pelletier has spent almost two years doing conversions and writing new applications to output on the Xerox Corp. printer. "You really need a dedicated person, at least initially," he says. Now that enough rewriting has been completed and documented, other programmers can take up the effort. "The tricky part is the interaction of the mainframe data with the Xerox language," he notes. Once it is done, he adds, it is pretty simple to maintain.

So how do you go about making your purchase decision? One option encouraged by many observers is to consider the new class of moderate-volume electronic printers. These 60 to 80 page/min. printers provide the flexibility and capabilities of nonimpact printing at costs that make them competitive with line printers.

Dunn recommends that instead of buying one high-volume printer to serve all of a company's printing needs, the organization could fulfill specific needs by purchasing a couple of these less expensive, lower volume machines. Another advantage of this strategy is that you have a backup in case one printer fails.

In any case, Stevenson says he believes the real mistake is to buy your printer as if it were just another peripheral. Unlike a tape drive, printers are "a much more sophisticated device that can impact the organization's profitability," he says. "The problem is that the people buying these things often lack management perspective. They buy based on the sales ticket, but that's less than 50% of the total cost."

Their analysis typically leaves out numerous related operating costs, the most significant of which are the costs of reprogramming applications to run on the new printer.

Other costs to consider are electricity, floor space, toner, chemicals and paper. These machines can consume massive amounts of computer capacity, personnel, capital and physical resources, if the organization is not careful.

The solution is to develop a

High-end priorities

Xplor International, a user group for organizations employing high-volume electronic printers, recently surveyed its membership about the features they would most like to see in this equipment.

In four basic functional areas — color, on-line communications, remote diagnostics and finishing — some clear preferences emerged from the responses of 477 members.

Color

- 74% of the members surveyed expressed a need for highlight color.
- 44% wanted full-process color.
- 83% said that they are not willing to sacrifice throughput for color.

On-line communication

- 73% wanted on-line backup of computer resources.
- 57% wanted on-line, two-way accounting communication.
- Other applications for which respondents said they thought on-line communication would be useful included resource management, job status, remote printing and queue management.

Remote diagnostics

- 47% said remote diagnostics are important.
- 43% said that they are not.

Finishing functions

- 50% rated on-line finishing as important.
- 45% said it was off-line finishing that was important.
- Of the finishing activities mentioned, 54% said they want envelope stuffing and 53% voted for folding. Book-stitching and three-hole punching each drew a 35% response, and 34% of the respondents requested corner-stitching.

ALAN RADDING

printer plan and printer architecture. Stevenson starts a printer plan with a detailed cost-of-ownership study, a complex matrix analysis involving more than 50 variables. He also recommends that clients create a formal printer strategy. "You have to create a complete business plan for each printer. You have to look at the projected volume, the output quality, your applications. You have to involve management," he says.

A good printer plan will anticipate the coding problem and specify how it will get done, either by the printer programming staff, the application programmers or an outside consultant.

Assess your needs first

The selection of a printer is truly application-dependent, consultants agree. For instance, at Chevron Information Technology Co. in San Ramon, Calif., the company performs a complete needs-assessment study before purchasing any printer, large or small. "We try to look out two to five years and see if the printer is appropriate for more than the immediate need," says senior systems analyst Fred Siegmund, who is responsible for overseeing Chevron's high-volume data center, departmental and end-user workstation printers.

Siegmund requires every request for a printer to be supported by a long questionnaire. This becomes the basis for the needs assessment and printer plan.

After ascertaining the type of printer currently in use, Siegmund analyzes the current and projected volume by looking at the total volume and daily, weekly and monthly breakdowns. He also identifies peak days, peak hours and the volume that occurs during the peaks. The user is asked to project volumes five years out.

After determining volume, Siegmund looks at the nature of printing. He determines the average-length job, the largest jobs, the number of different jobs run during a day and the importance of them.

The assessment also includes an operational evaluation. Siegmund wants to know whether the printer will be attended and who the attendant will be. Then he turns his attention to the paper. What kind of paper is required — cut-sheet, continuous form, gummed labels, card stock, multipart paper or preprinted forms? The analysis takes into account any demand for two-up printing (or two pages of information printed on one side of a single page) and duplex printing. The user is asked to estimate how often paper will need to be changed.

Siegmund goes on to examine the nature of the output, whether it requires graphics, if any preprinted forms use the color Chevron logo, if there is a need to print multiple fonts on a single page and if the user needs presentation-quality output. The Chevron analysis also takes into account the physical environment, including floor space, raised flooring, air-conditioning, ventilation and electrical power.

Finally, Siegmund asks the user to cost-justify the request. Users are required to present business reasons for making the request, identify any financial advantages and pinpoint cost savings related to the purchase.

In the end, Chevron has "a statistical analysis based on past history, existing applications, any new applications in development and any organizational changes," Siegmund explains.

In his analysis, the purchase price is about half the true cost of the printer. "You have to include the cost of consumables — including paper and toner — programming, service, manpower and overhead," he says.

Comparison shopping

Most firms perform a similar assessment. When Massachusetts Blue Cross/Blue Shield was shopping for a mainframe printer, it did a standard review of vendor offerings before narrowing its search to two vendors. Then, Pelletier conducted a detailed study of the two options.

Pelletier developed a survey of the various features that were important to Blue Cross and then ranked those features on a scale of 1 to 5, with 5 being the top. After telephoning users of each vendor's printer and polling their responses, Pelletier calculated which vendor did best in the areas most important to Blue Cross.

However, even a systematic approach to printer selection cannot guarantee that the organization's future needs will be met. For example, duplex printing scored very low in Blue Cross' importance rating. "It wasn't very important to us then, but now, we'd give it a 5," Pelletier says. Luckily, the model they chose scored well in duplex.

When Clarke did a printer cost study at Westinghouse, he discovered that duplex printing was the biggest factor in the cost equation because it cut paper consumption in half. However, his printer selection ultimately hinges on two broad issues: cost and convenience/service. "We weigh the volumes and look at the diversity," Clarke says. His organization prints 3,000 jobs a day centrally and several thousand more at remote sites.

In the end, Clarke says he prefers the large Xerox printers because they allow him to control the cost of paper better. "Duplex provides a better cost of paper. Your handling and operating costs are better," he says.

Fortunately, it is hard to make too grievous an error. "The worst cases I've ever heard were of companies that went with a new, unproven vendor that quickly went out of business. Then, they were stuck," COPI's Baker says.

To keep from encountering the printer monster, stay on the safe side, he says, and do your homework before purchasing. •

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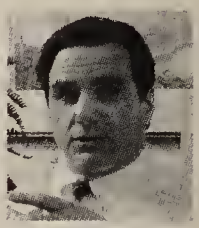

Paul Wheeler
Boise, ID.
"Paper handling."

C&C Computers and Communications

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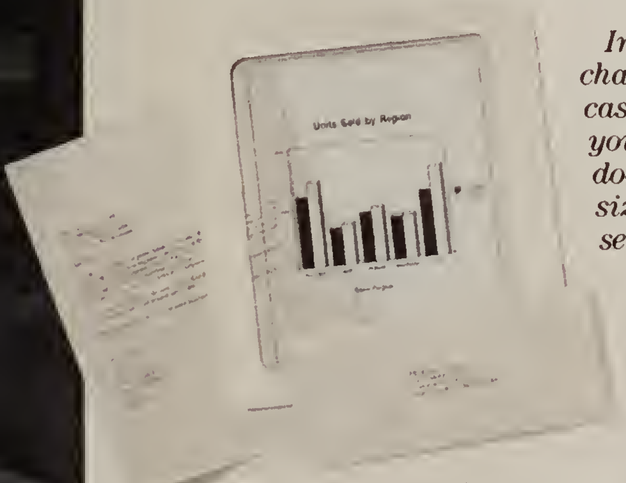

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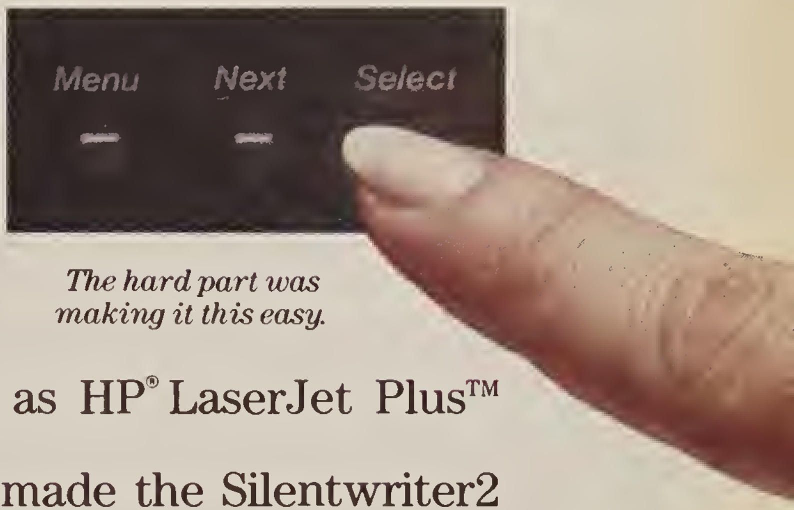

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Printers flex new functional muscles

BY SUZANNE WEIXEL

Today's printers may not yet slice, dice and cook dinner for you, but they are certainly expanding their functional repertoire.

Flexibility is fast becoming a virtue, especially within today's complex multivendor environments. Users are starting to demand printers that not only integrate into their complex system architectures but also accommodate an expanding range of output requirements. Although they might recognize the difficulty of these requests, users are adamant about not wanting any complexity to show through.

Printer vendors have no choice but to integrate their products into multivendor environments, according to Angele Boyd, manager of printer research at International Data Corp., a Framingham, Mass.-based market research company. "They must follow what is happening in the systems environment," she says, and that means accepting input from a wide variety of protocols.

At Mips Computer Systems, Inc. in Sunnyvale, Calif., Clair Althouse, director of IS, says that transparency of operation is now a requisite: "We decided up front that we wanted to have an environment in which all a user had to know was where to go to pick up the output." According to Althouse, an application run anywhere in the organization can be printed on any one of the company's four QMS, Inc. 6320 laser printers with throughput of 20 page/min. With its many emulations, the machine supports applications ranging from production reports to complex desktop publishing documents.

Althouse acknowledges that integrating a printer into the total systems environment is not always a simple issue.

"You must understand the standards you are using," Althouse says. Prior to implementing its network, Mips defined its internal de facto standards, settling on Transmission Control Protocol/Internet Protocol and Apple Computer, Inc.'s Appletalk with support for Adobe Systems, Inc. Postscript and ASCII.

An Ethernet local-area network is used throughout the organization and is attached to four Appletalk networks that reside within buildings two miles apart.

The printer servers on the Appletalk networks perform the behind-the-scenes interfacing, forming the physical connection between Appletalk and Ethernet using an I/O board. They make the software connection using a third-party server software package. At the other end, the server software is configured in the QMS Imageserver printer driver. Once set up, all the user needs to do, Althouse says, is to point at an icon and click, and the output is printed at the correct location.

For further flexibility, the printer also offers Ethernet, serial and parallel interfaces and supports various languages and emulations including Postscript, ASCII, Epson America, Inc. FX+ and IBM 5152.

Pulling it together

Smaller system users are also interested in connecting disparate systems to one printer. For Douglas Plott, an account representative at Bishop Business Equipment Co. in Lincoln, Neb., printer adaptability means one less piece of equipment to carry home with him.

An Apple Macintosh, IBM-compatible personal computer and dedicated word processor make up the machinery at Plott's office. Until last month, the only printer in use was a Kyocera Unison, Inc. F-1000A laser. While it had a serial port for the PC and a parallel port for the word processor, it did not support the Macintosh. When Plott wanted to print off that machine, he would pack it up and carry it home to his Apple Imagewriter.

"I was desperate for some way to attach my Mac to the same printer the other two were using," he says.

In October, Kyocera introduced the Q-8010, a 10 page/min. desktop laser printer that has serial, parallel and Appletalk ports, all of which can be used simultaneously. As a result, Plott no longer has to do his printing at home.

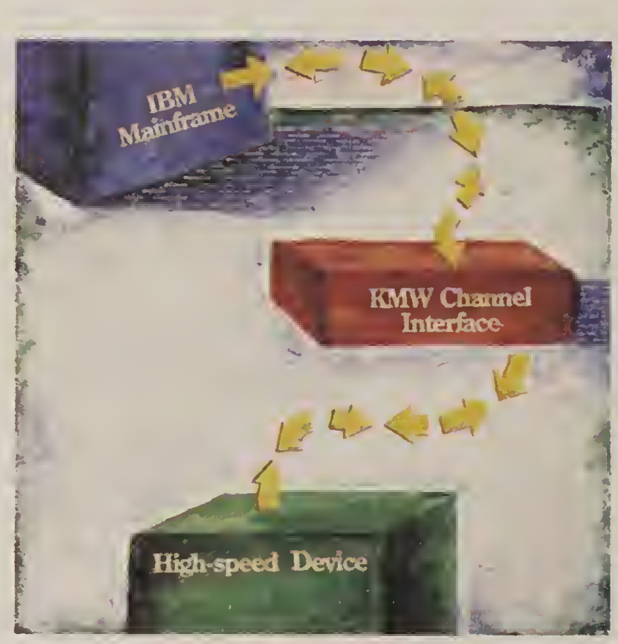
Confusing as it may be, the problems with printer integration do not stop once the printer is connected to the system. Once attached, it must be able to produce the quality and variety of output needed to meet users' expectations.

Most of the end users at Chevron Information Technology Co. in San Ramon, Calif., now have PCs on their desks, attached to small, inexpensive dot-matrix printers. However, these impact printers cannot provide the quality of output the users would like, says to Fred Siegmund, a senior systems analyst at the firm.

"Users know that sitting just around the corner attached to the mainframe network is a 10 page/min. laser printer that can produce all kinds of wonderful

---

Weixel is a free-lance writer based in Framingham, Mass.



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output. They're not satisfied with what's on their desks," he says.

Chevron is considering attaching the PCs to the printer that is on the mainframe network. "You'd eliminate the need for purchasing laser printers for each personal computer user even as you provide the users with access to high-quality output," Siegmund says.

With that in mind, Chevron is experimenting with an unreleased product from Xerox Corp. — the 10 page/min. 4045 Model 160 tabletop laser printer.

The printer's software-selectable commands can be used to allow both Hewlett-Packard Co.- and Postscript-compatible printing, according to Maria Monroy, Xerox printing systems marketing manager for the Model 160. The 160 has ports for serial, parallel and Appletalk interfaces, although only one can be active at a time. Conceivably, Siegmund says, the Model 160 could be attached to both Chevron's IBM mainframe network as well as to a group of PCs.

It is not enough, however, for a printer to accept various protocols and output a number of applications. It has to be able to print them on the right kind of paper for the job as well.

Adding paper-handling equipment to high-speed printers is one of the key ways in which they are being adapted for use in multiapplication environments, according to Naomi Cameron, associate director of research at BIS CAP International, Inc. in Waltham, Mass.

"Paper-handling equipment vendors are cooperating with the printer manufacturers in an attempt to tailor products to specific applications," she says.

At Intel Corp. in Santa Clara, Calif., two QMS 3320 Imageserver printers output an internal newsletter and engineering schematics. Users can select from the keyboard the size paper they need: large for engineering and smaller for the newsletter.

There is a price to be paid for this flexibility. For one thing, IDC's Boyd says, users may not always get the transparency they expect, especially in smaller systems.

Then there is the price tag. If a protocol converter is required, it could cost close to $1,500 for an IBM 3270 Type A converter. Add-on paper-handling devices such as the QMS' run from $4,000 to $10,000.

With the trend toward multisystem environments, however, the cost is most likely worth the result — added flexibility. Users are recognizing more and more the need for limber systems that they can integrate into their complex environments. •

ASK THE VENDOR

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Bo Bauguss
Micro Information Systems Manager
Ithaca Industries
Wilkesboro, N.C.

AVATAR CORP.: Yes, with Avatar's Printer Emulation series, you can share any PC printer between your mainframe and a PC network (or any PC or peripheral-sharing device). Avatar's PA1500G is best suited for printer-sharing applications because it acts as an intelligent switch, automatically toggling between PC and mainframe print sessions. Avatar's board-level products for Epson America, Inc. machines, IBM Proprinters and Hewlett-Packard Co. Laserjet Series II printers also allow PC and mainframe print sessions to be printed by a common printer. With these products, a user is able to manually turn a switch to select print sessions.

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ASK THE VENDOR

We bought the Tektronix Colorquick printer because it was less expensive than the various Postscript-compatible printers. Being a graphics designer for an ad agency, I have to be very exact when laying out an ad, and with Colorquick, I've run into a few problems with setting up page margins. These problems could be solved if Colorquick supported a printer driver specific to the Macintosh. How soon can we expect this to happen?

Karensue Nevius
Graphic Designer
Direct Marketing
Direct Advertising, Inc.
Carrollton, Texas

TEKTRONIX, INC.: The Tektronix Colorquick ink-jet printer already ships with a printer driver specifically for the Macintosh. This driver has been constructed to follow Apple guidelines for interaction with applications programs, including the way it reports information about printable areas and margins. Many applications, such as Canvas from Deneba Systems and Powerpoint from Microsoft Corp., use the information from the driver to display the printable area on the screen. Other applications such as Aldus Corp.'s Freehand display the entire page area, without necessarily showing the user where the printable margins are. Because the printable area for Colorquick is slightly smaller than the default print area for the Laserwriter printer from Apple Computer, Inc., Colorquick users will sometimes find themselves losing part of their art work near the margins.

For this reason, we added a button labeled "Info . . ." to the Page Setup dialog box of the Colorquick driver. When this button is pushed, a dialog box will be displayed on the screen diagramming the printable area and the margins for the paper size and orientation currently selected by the user. This tells the user the exact area he or she can use to print art work.

I use Precision Image's C448 Color Electrostatic plotter in a Geographic Information Systems, or GIS, application. What formats of raster and vector data can the plotter now process simultaneously, and what formats of raster/vector overlay will you be supporting in the near future?

Richard Rourk
Director of Mapping
and Records
Orange County Data Systems
Orlando, Fla.

PRECISION IMAGE CORP.: PIC's C448 Color Electrostatic plotters can combine vector formats such as Hewlett-Packard Graphics Language (HPGL), Calcomp, Inc.'s 906/907 and the standard computer graphics interface, known as CGI, with compressed and uncompressed raster formats from Zeh Graphics Systems, Image Systems Technology, Sysscan, Inc. and Scan-Graphics, Inc. Because the raster processing capability of our plotters is not tied to an electrical hardware interface, developing new raster processing algorithms is an easy task: You can use any vector format currently supported as an overlay to any raster format that the plotter's internal software supports. If, however, you need to plot a raster format not currently supported, we will build the proper interpreter into your plotter's software, at no charge for the duration of your service contract.

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To clone or not to clone?

Laserwriter IINTX vs. Turbo PS/400

BY FRAN HOLTSBERRY

Printer buyers probably think they have always had it tough when choosing between a "true" Adobe Systems, Inc. Postscript printer and a clone. Well, the choice has just gotten harder.

At least before, the choice could be boiled down to speed and lower cost on the clone side and Adobe's industry-standard fonts on the other.

Now that Adobe has taken its encrypted code out of the closet and made it available to all, the clones are no longer limited to mere comparability but can actually offer compatibility. Where they once could use only comparable fonts from Bitstream, Inc. and Harris Corp., they can now download Adobe fonts and offer the real thing.

PRODUCT FACE-OFF

What that means is that all previous judgments are off and purchase decisions must be made on the basis of individual merits.

Where to start

A good place to start is to actually compare the two types. Two worth looking at are the Laserwriter IINTX from Apple Computer, Inc. and the Turbo PS/400 from Newgen Systems, Inc.

The Laserwriter IINTX is considered the standard for high-performance, true Postscript-type laser printers and is also the standard high-end printer for Apple Macintosh systems. The Newgen printer, introduced last year, is a newcomer to the high end of the Postscript clone market. Both printers use a Canon U.S.A., Inc. Canon-SX engine with an engine life of 300,000 pages.

Both machines are marketed to run at 8 page/min. However, while Apple was the first Postscript printer to use the Motorola Corp. 68020 chip, the Newgen printer — like most clones — uses a reduced instruction set computing processor, in this case, the Intel Corp. 8960. Its actual performance beats the IINTX by a factor of five, even when processing complex graphics.

In terms of output quality, the Turbo PS/400 has a higher resolution, offering 400 rather than 300 dot/in. As a result, its output appears cleaner.

If you were to open up both printers and compare the insides, you would find them to be virtually identical, down to the toner cartridge and paper trays.

Each handles 8½- by 11-in. paper, regular bond, coated paper and certificate-size documents. You can also hand-feed other paper sizes, such as legal. Because of this, maintenance and setup are exactly alike on both machines.

Where the machines differ is the ports they support, although both allow you to switch among ports. On the Turbo, the mechanism is located on the front of the machine on a push-button panel; on the IINTX, a DIP switch on the back does the job, making it a little harder to reach.

The IINTX is equipped with a standard serial port as well as the standard Appletalk port for Apple's Localtalk networking. What is lacking is a parallel port; the IINTX is the only high-end laser printer without one.

The PS/400 comes equipped with an Appletalk port, a standard serial port and a Centronics, Inc. parallel port for fast, standard connections with personal computer systems.

While both printers have 35 resident fonts, what distinguishes the Turbo from many clones is that it supports fonts from the Adobe library. A comparison between its output and that of the IINTX is not available at this time.

One surprise on the IINTX was some trouble downloading fonts, especially the Optima font. Its output had cracks throughout it, which made it look like poorly-applied press-on type. Once we loaded the Adobe Type Manager, however, the problem cleared up.

While both of these printers offer emulations of commonly used non-Postscript printers, the Newgen system clearly has a broader and more versatile set of emulations.

This is important for applications that do not support Postscript, such as word processors, spreadsheets and databases that are written strictly for dot matrix or daisywheel printers. In fact, the ability of a Postscript printer to emulate other devices may save you the cost of another printer.

Common link

Both the IINTX and PS/400 offer Hewlett-Packard Co. Laserjet emulation, one of the most common non-Postscript printers available. The Turbo PS/400 goes one step further, however, emulating the more versatile HP Laserjet II series and supporting the emulation with resident fonts.

The IINTX emulates the Diablo 630, but the Diablo daisywheel printer is rapidly being phased out in favor of the more versatile Epson LQ 800 dot matrix systems, which are supported by the PS/400.

The PS/400 also emulates HP's 7475A Hewlett-Packard Graphics Language plotter, which is considered a standard among plotter systems and is supported by most computer-aided design software.

Priced at around $7,000, the IINTX comes standard with 2M bytes of random-access memory. This machine is particularly appropriate for high-end Apple hardware on Localtalk networks and for companies that want to minimize incompatibility problems and stay with homogeneous Apple systems. It is also the fastest and most versatile of the true Postscript printers.

At $6,500, the Turbo PS/400 offers 3M bytes of RAM and provides the added bonus of supporting true Adobe fonts at a lower price. If you are willing to go with a clone, it offers the power and speed to serve as a network printer and is capable of working in environments with multiple systems by various vendors. •

Holtsberry is publications editor of "Computing and Communications Services" at California State University in Chico, Calif.

Low-speed lasers (10 page/min. or less)

VENDOR	PRODUCT	ENGINE	PERFORMANCE (PAGE/MIN.)	SUGGESTED DUTY CYCLE (PAGE/MONTH)	ON-BOARD/EXPANDABLE MEMORY (BYTES)	HARDWARE EMULATIONS	PAGE DESCRIPTION LANGUAGES SUPPORTED	NUMBER OF RESIDENT FONTS	RESIDENT MACROS FOR FORMS	BAR CODE PRINTING CAPABILITIES	PRINTS ON WHAT TYPES OF MEDIA	MAX. SHEET INPUT CAPACITY	HOST INTERFACES SUPPORTED	WORKS WITH WHAT COMPUTERS	DIMENSIONS (H x W x D)	WEIGHT (pounds)	TYPICAL USE	BASE PRICE
Abaton (A subsidiary of Everex Systems, Inc.) **(800)444-5321**	Laserscript	TEC-1305	6	3,000	3M/6M	HP Laserjet Series II	PCL, Postscript	Varies with emulation	No	No	All	150	RS-232, parallel, Appletalk	Apple, IBM PC AT	8.3x16-x15.4	35.3	Forms, graphics, labels, spreadsheets, word processing, desktop publishing, typesetting	$3,995
Advanced Technologies International (ATI) **(800) 937-4284**	0880 1DW-2	Ricoh LP 4080	8	6,000	768K/1.2M	Diablo 630, Epson FX-80, HP Laserjet, IBM Proprinter	Laserdrive (proprietary)	8	No	Yes	Letter, half letter, labels, transparencies	250	RS-232, Centronics, Data products parallel, coaxial, twinaxial	Any computer with RS-232, Centronics, Data products parallel interfaces	14 x 21 x 17	88	Forms, word processing	$4,795
	0880 1DW-3	Ricoh LP 4080	8	6,000	2M/NA	Diablo 630, Epson FX-80, HP Laserjet, HPGL, Tektronix Fast-Bit Image	Laserdrive (proprietary)	10	No	No	Letter, half letter, labels, transparencies	250	RS-232, Centronics, Dataproducts parallel, coaxial, twinaxial	Any computer with RS-232, Centronics, Data products parallel interfaces	14 x 21 x 17	88	Forms, graphics, word processing	$4,795
AEG Olympia, Inc. **(201) 231-8300**	Laserstar 6E	Ricoh	6	3,000	512K/5M	Diablo, Epson, HP Laserjet Series II, HPGL (optional)	Olyscript (proprietary)	16	No	Yes	All	150	RS-232, parallel	IBM PCs and compatibles	8.2 x 16.5 x 16.1	37.5	Forms, graphics, spreadsheets, word processing	$1,999
Alps America **(408) 432-6000**	LPX 600	Sharp	6	5,000	512K/2M	Diablo 630, Epson FX-80, IBM Proprinter, IBM Graphics printer, HP Laserjet Plus	None	2	Yes	Yes	Letter, legal, half letter, labels, transparencies	100	RS-232C, Centronics parallel, video	IBM PC AT, PS/2	12.87 x 17.75 x 16.37	37.9	Graphics, spreadsheets, word processing	$2,175-$2,795
Apple Computer, Inc. **(408) 996-1010**	Laserwriter IINTX	Canon LBP-SX	8	NA	2M/12M	Diablo 630, HP Laserjet Plus	Postscript, Quickdraw	35	No	Yes	Letter, legal, labels, envelopes, transparencies, A4, B5	200	RS-232C, RS-422	All Macintoshes, Apple IIGS, Apple IIE, most MS-DOS with serial port	8.5x20x 18.9	46	Forms, graphics, labels, spreadsheets, word processing, transparencies	$6,999
	Laserwriter IINT	Canon LBP-SX	8	NA	2M/NA	Diablo 630	Postscript, Quickdraw	35	No	Yes	Letter, legal, labels, envelopes, transparencies, A4, B5	200	RS-232C, RS-422	All Macintoshes, Apple IIGS, Apple IIE, most MS-DOS with serial port	8.5x20x 18.9	46	Forms, graphics, labels, spreadsheets, word processing, transparencies	$4,999
AT&T **(800) 247-1212**	593 Laser printer	TEC	6	3,000	512K/4.5M	Epson FX-86E, HP Laserjet Series II, IBM Proprinter XL	Postscript compatible add-on-board	8	Yes	Yes	All	150	RS-232C, Centronics parallel	PCs, minicomputers	8.3 x 16.1 x 15.4	35	Forms, graphics, spreadsheets, word processing	$1,995
BGL Technology Corp. **(805) 987-7305**	Laserleader Mark I	Dataproducts	10	25,000	24M/28M	HP Laserjet Series II, HPGL, DEC LN03, LN03 Plus, Tektronix 4014, Versatec	Postscript	35	Yes	Yes	All	750	RS-232C, Centronics, Dataproducts, Versatec, parallel, Appletalk, Ethernet (Decnet TCP/IP)	All	12.6 x 18.9 x 19.4	85	Graphics, word processing, multihost networking	$8,995
Brother International **(201) 981-0300**	HL-8PS	Canon SX	8	3,000	2M/6M	HP Laserjet Series II	BR-Script (Postscript compatible interpreter)	35	No	No	Letter, legal, labels, envelopes, transparencies	200	RS-232C, Centronics parallel, Appletalk (optional)	IBM PCs and compatibles, (Apple computers with the optional Appletalk interface cartridge)	9.1 x 17.9 x 19	44	Graphics, labels, word processing	$4,495
	HL-8E	Canon SX	8	3,000	1M/3M	Brother Twinwriter, Diablo 630, Epson FX-80, HP Laserjet Series II, HPGL, IBM Proprinter	None	44	No	No	Letter, legal, labels, envelopes, transparencies	200	RS-232C, Centronics parallel	IBM PCs and compatibles	9.1 x 17.9 x 19	44	Graphics, labels, word processing	$2,895
Bull H. N. Information Systems, Inc. **(508) 294-6000**	Model 75	Ricoh	6	1,500	1M/2M	Diablo 630, HP Laserjet Plus	None	4	No	Yes	Letter, legal, transparencies	150	RS-232, Centronics parallel	All PCs and workstations	8.1 x 16.1 x 16.5	37	Word processing	$1,495
Canon USA **(516) 488-6700**	LBP-4	Canon	4	2,500	512K/2.5M	Diablo 630	Capsl III (proprietary)	17	Yes	No	Letter, legal, envelopes, executive, A4	50	RS-232C, Centronics parallel	All IBM and compatibles	8 x 13.8 x 15.9	23	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$1,545
	LBP-8 Mark III	Canon	8	5,000	1.5M/NA	Diablo 630	Capsl III (proprietary)	17	Yes	No	Letter, legal, envelopes, executive, A4	200	RS-232C, Centronics parallel	All IBM and compatibles	9 x 17.9 x 20.7	45.5	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$2,995
	LBP-8 Mark III T-Dual Bin	Canon	8	5,000	1.5M/NA	Diablo 630	Capsl III (proprietary)	17	Yes	No	Letter, legal, envelopes, executive, A4	400	RS-232C, Centronics parallel	All IBM and compatibles	12.7 x 17.9 x 20.9	58.3	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$3,995
	LBP-8 Mark III R-Dual Bin, Duplexing	Canon	8	5,000	1.5M/NA	Diablo 630	Capsl III (proprietary)	17	Yes	No	Letter, legal, envelopes, executive, A4	400	RS-232C, Centronics parallel	All IBM and compatibles	12.7 x 17.9 x 28.8	67.1	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$4,495

*Letter, legal, half letter, labels, envelopes, transparencies

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld.* When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

VENDOR	PRODUCT	ENGINE	PERFORMANCE (PAGE/MIN.)	SUGGESTED DUTY CYCLE (PAGE/MONTH)	ON-BOARD/EXPANDABLE MEMORY (BYTES)	HARDWARE EMULATIONS	PAGE DESCRIPTION LANGUAGES SUPPORTED	NUMBER OF RESIDENT FONTS	RESIDENT MACROS FOR FORMS	BAR CODE PRINTING CAPABILITIES	PRINTS ON WHAT TYPES OF MEDIA	MAX. SHEET INPUT CAPACITY	HOST INTERFACES SUPPORTED	WORKS WITH WHAT COMPUTERS	DIMENSIONS (H x W x D)	WEIGHT (pounds)	TYPICAL USE	BASE PRICE
Data General Corp. **(508) 366-8911**	Model 6640	Sharp	6	3,000	512K/ 4.5M	HP Laserjet Series II	Postscript	14	No	No	All	500	RS-232, RS-422, Centronics parallel, Appletalk	All, if correct application driver is supported	10.9 x 13.4 x 14.2	33	Graphics, spreadsheets, word processing	$1,795, $2,995 (Postscript Model 6646)
	Model 6454	Canon	8	5,000	512K/ 1.5M	Diablo 630	None	4	No	No	Letter, legal, half letter, labels, transparencies	1000	RS-232, RS-422, Centronics parallel	All, if correct application driver is supported	9.1 x 17.9 x 19	44	Graphics, word processing	$2,795
Dataproducts Corp. **(818) 887-8039**	LZR 650	Sharp	6	3,000	512K/4.5M	Diablo 630, Epson FX, HP Laserjet Series II, IBM Proprinter, Graphics printer	None	16	No	No	All, executive	250	RS-232C, Centronics parallel	IBM PC XT, AT, PS/2 and compatibles	10.9 x 13.4 x 14.2	33.5	Word processing	$1,695
Digital Equipment Corp. **(508)493-5111**	LN03 Image Printer	Ricoh	8	10K	2M/NA	Tektronix 4010/4014	Postscript	29	No	Yes	Letter, legal, transparencies	NP	RS-422 synchronous, RS-422 asynchronous	DEC	41x60x-28	218	Graphics	$4,995
	Script Printer	Ricoh	8	10K	2M/NA	IBM Proprinter, Tektronix 4010/4014	Postscript	29	No	Yes	Letter, legal, labels, transparencies	NP	RS-232C	DEC, IBM	13x21x-23	36.3	Graphics	$5,595
	LN03 Plus	Ricoh	8	10K	1M/1.26M	IBM PC Proprinter, Tektronix 4010/4014	Postscript	17	No	Yes	Letter, legal, labels,transparencies	NP	RS-232C, DEC 423	DEC, IBM	15x21x-23.5	36.3	Word processing	$4,295
Digital Design, Inc. **(800) 733-0908**	Model 636 Check Printer	Ricoh 4081	8	10,000	1.5M/4M	HP Laserjet Plus	None	15	No	Yes	Letter, labels, transparencies	250	RS-232C, Centronics parallel	Any ASCII CPU with RS232 or parallel interface	13x-20.9x-16.5	75	Forms, checks	$5,995
Electronic Form Systems **(214) 250-7000**	Formwriter 8	Ricoh LPH150	7.5 (legal)	25,000	NA	HP Laserjet	FGL (proprietary)	36	No	No	Letter, legal, labels, envelopes	250	RS-232	IBM PCs	17.1x 21.5x-12.5	88	Forms	$8,995
	Formwriter 2EX	Canon, model LBP-SX	8 (letter), 5 (legal)	5,000	NA	HP Laserjet	FGL (proprietary)	36	No	No	Letter, legal, lablels, envelopes	200	RS-232	IBM PCs and compatibles	8.5x18x 19	50	Forms	$4,995
Epson America, Inc. **(800) 922-8911**	EPL-6000	TEC	6	3,000	512K/4.5M	Epson FX (optional), HP Laserjet Series II	Postscript (optional)	3	No	No	All	150	RS-232C, RS422A, parallel	Industry Standard Architecture-based PCs	8.3 x 16.1 x 15.4	36	Forms, graphics, labels, spreadsheets, word processors and virtually any business applications	$1,499
Facit, Inc. **(800) 733-2248**	P6060	TEC model LB-1305B	6	3,000	512K/4.5M	HP Laserjet Series II, IBM Proprinter (optional cartridge)	None	10	Yes	Yes (optional)	All, A4, A5	150	RS-232C, RS-422A, parallel	Any that support HP emulation	8.3 x 16.1 x 15.4	35	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$1,595
Fujitsu America, Inc. **(800) 626-4686**	RX7100PS +	M3701M	5	3,000	4M/NA	Diablo 630, Epson FX-85, HP Laserjet Series II, IBM Proprinter	Postscript	3	No	Yes	Letter, legal, half letter, labels, transparencies	150	RS-232C, Centronics parallel, Appletalk	Macintosh line, IBM PCs and compatibles	6.7x16x-16	44	Graphics, word processing	$4,795
	RX7100	M3701M	5	3,000	640K/4.6M	HP Laserjet	PCL	3	No	No	Letter, legal, labels, transparencies	150	RS-232C, Centronics parallel	IBM PCs and compatibles	6.7 x 16 x 16	37.5	Forms, word processing	$1,495
	RX7100PS	M3701M	5	3,000	2M/NA	Diablo 630, Epson FX-84, HP Laserjet Series II, IBM Proprinter	Postscript	3	No	Yes	Letter, legal, half letter, labels, transparencies	150	RS-232C, Centronics parallel, Appletalk	Macintosh line, IBM PCs and compatibles	6.7 x 16 x 16	44	Graphics, word processing	$3,995
Genicom Corp. **(703) 949-1000**	Model 6145*	Canon SX 400 dot/in.	8	5,000	3M/5M	Diablo 630, HP GL, Laserjet Series II, IBM Graphics	ACE, Postscript	38	Yes	No	All	200	RS-232, parallel, Appletalk (optional)	IBM and compatibles	9.4 x 20.1 x 20.8	42	Forms, graphics, labels, spreadsheets, word processing	$5,494
Hewlett-Packard Co. **(800) 752-0900**	Laserjet IIP	Canon LBP-LX	4	2,500	512K/4M	Epson FX/IBM proprinter emulation card (optional)	None	14	No	Yes	Letter, legal, labels, envelopes, transparencies, executive	50	Serial, parallel	IBM compatible	8 x 13.8 x 24.9	22	Spreadsheets, word processing	$1,495
	Laserjet Series II	Canon LBP-SX	8	5,000	512K/4M	None	Postscript supported with Jetscript Kit	6	No	Yes	Letter, legal, labels, envelopes, transparencies, executive	200	Serial, parallel	IBM compatible	8.5 x 18 x 24.5	50	Forms, spreadsheets, word processing, desktop publishing	$2,495
	Laserjet IID	Canon RX	8	7,500	640K/4M	None	Postscript supported with cartridge accessory	14	No	Yes	Letter, legal, labels, envelopes, transparencies, executive	400	Serial, parallel	IBM compatible	12.3 x 18 x 37.5	74	Forms, spreadsheets, word processing, desktop publishing	$4,295
IBM **(800) 426-2468**	Laser Printer	IBM	10	20,000	512K/3.5M	HP GL, HP Laserjet Series II, IBM GL, Personal Printer Data Stream	Postscript	10	No	Yes	All	200	RS-232C, parallel	IBM PS/2 and compatibles	10.2 x 14.2 x 20.5	33.6	Forms, graphics, labels, spreadsheets, word processing	$2,595
Kyocera **(415) 748-6680**	F-2000A	Kyocera	10	10,000	1M/5M	Diablo 630, Epson FX80, HP Laserjet Series II, IBM Graphics, NEC Spinwriter, line printer, Qume Sprint II	Prescribe, Quickdraw	79	Yes	Yes	All	500	RS-232, parallel	Macintoshes (in non-Postscript mode, IBM PCs and compatibles	14.4 x 18.5 x 18.3	70.6	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$4,695
	F-800A	Kyocera	8	10,000	512K/5M	Diablo 630, Epson FX80, HP Laserjet Series II, IBM Graphics, NEC Spinwriter line printer, Qume Sprint II	Prescribe, Quickdraw	79	Yes	Yes	All	150	RS-232, parallel	Macintosh (in non-Postscript mode, IBM PCs and compatibles	8.1 x 15.4 x 16.8	29.8	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$2,295

VENDOR	PRODUCT	ENGINE	PERFORMANCE (PAGE/MIN.)	SUGGESTED DUTY CYCLE (PAGE/MONTH)	ON-BOARD/EXPANDABLE MEMORY (BYTES)	HARDWARE EMULATIONS	PAGE DESCRIPTION LANGUAGES SUPPORTED	NUMBER OF RESIDENT FONTS	RESIDENT MACROS FOR FORMS	BAR CODE PRINTING CAPABILITIES	PRINTS ON WHAT TYPES OF MEDIA	MAX. SHEET INPUT CAPACITY	HOST INTERFACES SUPPORTED	WORKS WITH WHAT COMPUTERS	DIMENSIONS (H x W x D)	WEIGHT (pounds)	TYPICAL USE	BASE PRICE
Lasersmith, Inc. **(408) 727-7700**	PS-415*	Canon 415 dot/in. CX	8	3,000-5,000	3M/5M	None	Postscript	35	No	Yes	Letter, half letter, labels, envelopes, transparencies	100	Parallel	IBM PC AT and compatibles	11.4 x 18.7 x 16.3	54	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$2,495
	PS-830+*	Canon 415 dot/in. CX	8	3,000-5,000	4M/NA	None	Postscript	35	No	Yes	Letter, half letter, labels, envelopes, transparencies	100	Parallel	IBM PC AT, PS/2 and compatibles	11.4 x 18.7 x 16.3	54	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$3,595
	PS-415 GT*	Canon 415 dot/in. CX	8	3,000-5,000	4M/12M	HP Laserjet	Postscript	35	No	Yes	All	100	Parallel	IBM PC AT, XT and compatibles	11.4 x 18.7 x 16.3	54	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$3,695
Lexi Computer Systems Corp. **(508) 681-1118**	Lexi 800 Versions T/C	Kyocera	8	10,000	512K/4M	HP Laserjet Series II, IBM 4214, 5225	PCL, Prescribe	79	Yes	Yes	Letter, legal, labels, envelopes, transparencies	150	RS-232, Centronics parallel, coaxial, twinaxial	IBM PCs, System/36, 38, AS/400, IBM 3270	8x16x16	30	Forms, graphics, labels, spreadsheets, word processing, bar codes	$2,295 ($1,495 more for coaxial or twinaxial)
	Lexi 2000	Kyocera	10	10,000	512K/4M	DEC LN03, HP Laserjet Series II, IBM 3287, 3812-II, 4214, 5224, 5219	AFP/IPDS, PCL, Prescribe	79	Yes	Yes	All	1500	RS-232 coaxial, twinaxial parallel	DEC VAX, Macintosh, IBM PCs, System/36, 38, AS/400, 3270	13.6 x 17.3 x 17.5	64	Forms, graphics, labels, spreadsheets, word processing, line printer applications	$4,295
	Lexi 8010	Kyocera	10	10,000	5M/7M	Apple Laserwriter, HP Laserjet Series II, IBM 4214, 5219, 5225	PCL, Postscript	79	Yes	Yes	All	1500	RS-232, Centronics parallel, Appletalk	Macintosh, IBM PCs, System/36, 38, AS/400, 3270, DEC VAX	16.9 x 17.7 x 12.6	58	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$6,995
	Lexi 1000	Kyocera	10	10,000	512K/4M	HP Laserjet Series II, IBM 3287, 3812-II, 4214, 5219,	IBM IPDS, PCL, Prescribe	79	Yes	Yes	All	1500	RS-232, Centronics parallel (coaxial, twinaxial)	Macintosh, IBM PCs, System/36, 38, AS/400, 3270	13.6 x 17.3 x 17.5	64	Forms, graphics, labels, spreadsheets, word processing, line printer applications	$2,795
Mannesmann Tally Corp. **(800) 843-1347**	MT905	TEC	6	4,000	512K/4M	Diablo 630, Epson FX-80, IBM Proprinter (optional), HP Laserjet Series II	None	6	Yes	Yes	Letter, legal, labels, envelopes, transparencies, A4, B5	150	RS-232, Centronics parallel	All IBM PC compatibles	8.3 x 16.1 x 15.4	35	Graphics, labels, spreadsheets, word processing	$1,995
	MT910	Kyocera	10	10,000	512K/2M	Diablo 630, Epson FX, HP Laserjet Plus, IBM Proprinter, Qume Sprint II	None	9	Yes	Yes	Letter, legal, labels, envelopes, transparencies, A4	500	RS-232, Centronics parallel	All IBM PC compatibles	14.4 x 36 x 18.3	70	Graphics, labels, spreadsheets, word processing	$3,995
	MT910 Universal System	Kyocera	10	10,000	2M/NA	HP Laserjet	Imagen DDL, Postscript-compatible interpreter	39	No	Yes	Letter, legal, labels, envelopes, transparencies, A4	500	Video	IBM PC AT, XT and compatibles	14.4 x 36 x 18.3	70	Graphics, labels, spreadsheets, word processing	$4,795
NCR **(316) 636-8570**	6435	TEC	6	5,000	512K/4M	Diablo 630 API, Epson FX86E, HP Laserjet Series II, IBM Proprinter XL	None	6	Yes	Yes	All	150	RS-232, RS-422, Centronics parallel	All IBM PC compatibles, NCR Tower	8.3 x 35.4 x 15.4	36	Forms, graphics, labels, spreadsheets, word processing	$2,395
NEC Technologies **(508) 264-8000**	Silentwriter 890XL	NEC	8	5,000	4M/8M	Diablo 630, HP Laserjet Series II	Postscript	35	No	Yes	Letter, legal, labels, transparencies	500	RS-232, parallel, Appletalk	Apple, DEC, IBM mini and mainframe	15.4 x 18.5 x 20.7	68	Forms, graphics, word processing, desktop publishing	$6,995
	Silentwriter 290	Canon LBP-UX	8	5,000	2M/4M	HP Laserjet Series II	Postscript	35	No	Yes	Letter, legal, labels, envelopes, transparencies	200	RS-232, parallel, Appletalk	Apple, DEC, IBM mini and mainframe	11.4 x 24.5 x 17.3	49	Forms, graphics, word processing, desktop publishing	$4,495
Newgen Systems Corp. **(714) 641-8600**	TurboPS/400*	Canon SX	8	5,000	3M/5M	Epson LQ800, HP Laserjet Series II, HP 7475A Plotter	Postscript	35	No	Yes	All	200	RS-232C, Centronics parallel, Appletalk, (SCSI hard drive optional)	IBM PCs, PS/2 and compatibles, Macintoshes, any with Centronics or RS-232 interface	5.5 x 18 x 19.5	42	Forms, graphics, labels, word processing	$6,495
	TurboPS/300	Canon SX	8	5,000	2M/5M	Epson LQ800, HP Laserjet Series II, HP 7475A Plotter	Postscript	35	No	Yes	All	200	RS-232C, Centronics parallel, Appletalk, (SCSI hard drive optional)	IBM PCs, PS/2 and compatibles, Macintoshes, any with Centronics or RS-232 interface	5.5 x 18 x 19.5	42	Forms, graphics, labels, word processing	$5,495
	TurboPS/480*	Canon SX	8	5,000	3M/5M	Epson LQ800, HP Laserjet Series II, HP 7475A Plotter	Postscript	35	No	Yes	All	200	RS-232C, Centronics parallel, Appletalk, (SCSI hard drive interface optional)	IBM PCs, PS/2 and compatibles, Macintosh and any other computers with Centronics or RS-232 interface	5.5 x 18 x 19.5	42	Graphics	$8,495
Office Automation Systems, Inc. **(619) 452-9400**	Laserpro Exec	TEC	6	3,000	512K/4.5M	HP Laserjet Plus, Series II	Express Command Langauge	6	Yes	Yes	Letter, legal, labels, envelopes, transparencies, A4, B5	150	RS-232C, RS-422A, Centronics parallel	IBM PCs and compatibles	8.25 x 16.13 x 15.38	35	Forms, labels, spreadsheets, word processing	$1,795
	Laserpro Express Series	TEC	8	5,000	2.5M/4.5M	Diablo 630, Epson FX-80, HP Laserjet Plus, HPGL, IBM Proprinter, NEC Spinwriter, Line Printer, Qume Sprint II	Express Command Language	33	Yes	Yes	Letter, legal, labels, envelopes, transparencies, A4, B5	250	RS-232, Centronics parallel	IBM PCs and compatibles	12.2 x 16.2 x 15.5	50.6	Forms, labels, spreadsheets, word processing	$2,350-$4,095

VENDOR	PRODUCT	ENGINE	PERFORMANCE (PAGE/MIN.)	SUGGESTED DUTY CYCLE (PAGE/MONTH)	ON-BOARD/EXPANDABLE MEMORY (BYTES)	HARDWARE EMULATIONS	PAGE DESCRIPTION LANGUAGES SUPPORTED	NUMBER OF RESIDENT FONTS	RESIDENT MACROS FOR FORMS	BAR CODE PRINTING CAPABILITIES	PRINTS ON WHAT TYPES OF MEDIA	MAX. SHEET INPUT CAPACITY	HOST INTERFACES SUPPORTED	WORKS WITH WHAT COMPUTERS	DIMENSIONS (H x W x D)	WEIGHT (pounds)	TYPICAL USE	BASE PRICE
Okidata **(800) 654-3282**	Okilaser 400	Oki	4	3,000	512K/2.5M	HP Laserjet Series II	None	17	Yes	Yes	All	200	RS-232C, parallel	IBM PCs and compatibles	5.25 x 17.7 x 17.7	24	Word processing	$1,395
Olivetti Office USA **(201) 526-8200**	PC 306	TEC LB 1305	6	3,000	512K/4.5M	Epson FX-80 (optional), HP laserjet Series II, IBM Proprinter	PCL, Postscript	6	Yes	Yes	All	150	Serial. parallel	Any with serial or parallel interface	8.4 x 16.4 x 15.6	35.5	Forms, graphics, word processing	$1,595
Packard Bell **(800) 733-4422**	PB9500	TEC	6	4,000	1.5M/4.5M	HP Laserjet Series II, (Diablo 630, Epson FX, IBM Proprinter optional)	None	6	No	No	Letter, legal, labels, envelopes, transparencies	150	RS-232C, RS-422A, Centronics parallel	IBM PC and compatibles	8.3 x 16.1 x 15.4	35.3	Forms, graphics, labels, spreadsheets, word processing	$2,195
Panasonic Communications & Systems Co. **(201) 348-7686**	Panasonic KX-P4420 Laser Partner	Panasonic	8	3,000	512K/4.5M	HP Laserjet Series II	None	22	No	Yes	Letter, legal, labels, envelopes, transparencies	250	RS-232C (optional), Centronics parallel	IBM PCs and compatibles	19.7 x 17.3 x 18.5	44.1	Forms, graphics, labels, spreadsheets, word processing	$1,895
Personal Computer Products, Inc. **(619) 485-8411**	Laserimage 1030	Ricoh 1060	6	3,000	512K/5M	HP Laserjet Series II, (Diablo 630, Epson FX-80, IBM Proprnter II (optional)	Imagescript (optional)	38	No	Yes	All	150	RS-232C, parallel	IBM PC and compatibles	8.1 x 24.9 x 16.5	37	Forms, graphics, labels, spreadsheets, word processing	$2,295
	Laserimage 1035	Ricoh 1060	6	3,000	1M/5M	Diablo 630, Epson FX-80, HP Laserjet Series II, HPGL, IBM Proprinter II	Imagescript (optional)	38	No	Yes	All	150	RS-232C, parallel	IBM PCs and compatibles	8.1 x 24.9 x 16.5	37	Forms, graphics, labels, spreadsheets, word processing	$2,795
	Laserimage 1100-PS	Ricoh 1060	6	3,000	2M/4M	HP Laserjet Series II	Postscript	59	No	Yes	All	150	RS-232C, RS-422, parallel	IBM PCs and compatibles	8.1 x 24.9 x 16.5	37	Forms, graphics, labels, spreadsheets, word processing	$4,995
	Laserimage 2020	Ricoh 4081	8	10,000	512K/5M	HP Laserjet Series II, (Diablo 630, Epson FX-80, IBM Proprinter II optional)	Imagescript (optional)	38	No	Yes	Letter, labels, transparencies	250	RS-232C, parallel	IBM PCs and compatibles	13 x 20.9 x 16.5	81.6	Forms, graphics, labels, spreadsheets, word processing	3,695
	Laserimage 2025	Ricoh 4081	8	10,000	1M/5M	Diablo 630, Epson FX-80, HP Laserjet Series II, HPGL, IBM Proprinter	Imagescript (optional)	38	No	Yes	Letter, labels, transparencies	250	RS-232C, parallel	IBM PCs and compatibles	13 x 20.9 x 16.5	81.6	Forms, graphics, labels, spreadsheets, word processing	$4,195
Printer Systems Corp. **(800) 638-4041**	Intelliprint 106	Ricoh	6	3,000	512K/3M	DEC LN03 Plus, HP Laserjet Series II, IBM 3812	IPDS	16	No	Yes	All	400	RS-232, Centronics parallel, coaxial, twinaxial	DEC VAX series, IBM System/36, 38, AS/400, 3000, 4300, 9370 series	12.6 x 16.1 x 16.5	50	Forms, graphics, labels, spreadsheets, word processing	$2,495
Printware, Inc. **(800) 456-1400**	720IQ*	Toshiba	8	20,000	4M/8M	None	Postscript	35	No	Yes	All	250	RS-232, parallel, Appletalk	All PCs and Macintosh	12 x 18.5 x 19.5	80	Forms, graphics, labels, spreadsheets, word processing, any postscript application	$14,200
Q/COR **(800) 548-3420**	Quadlaser PS	Ricoh LP4081	8	10,000	4M/NA	None	Postscript	35	No	No	Letter, transparencies, A4	250	RS-232, RS-422, Centronics parallel, Appletalk	Apple, all IBM and compatibles	13 x 20.9 x 23.2	81.6	Desktop publishing	$2,995
	Quadlaser I	Ricoh LP4081	8	10,000	2M/NA	Epson, IBM Proprinter, HP Laserjet Plus, HPGL	None	2	No	No	Letter, labels, transparencies, A4	250	RS-232C, Centronics parallel	IBM PC AT, XT, PS/2 and compatibles	13 x 20.9 x 23.2	81.6	Word processing	$2,495
QMS, Inc. **(408) 986-9400**	3308/S Image Server XP	Canon TX	8	10,000	3M/6M	Diablo 630, Epson FX Plus, IBM 5152, 1403, Tektronix 4010/4014	Impress, (Ultrascript for Postscript-compatibility optional)	2	No	No	All	400	RS-423, Centronics, Dataproducts, Versatec parallel, Ethernet (TCP/IP)	Apollo, DEC, VAX series, Sun Microsystems	13x18x 19.4	54	Graphics, spreadsheets, word processing	$10,950
	2308/S Image Server XP	Canon SX	8	10,000	3M/6M	Diablo 630, Epson FX Plus, IBM 5152, 1403, Tektronix 4010/4014	Impress, (Ultrascript for Postscript-compatibility optional)	2	No	No	All	200	RS-423, Centronics, Dataproducts, Versatec parallel	Apollo, DEC VAX series, Sun Microsystems	9x18x25	42	Graphics, spreadsheets, word processing	$9,250
QMS/Laser Connection, Inc. **(800) 523-2696**	QMS-PS 810	Canon SX	8	5,000	2M/3M	Diablo 630, HP Laserjet Plus, HPGL	PCL, Postscript	35	Yes	Yes	All, A4	200	RS-232, parallel, Appletalk	Macintoshes, IBM PCs and compatibles, most mini and mainframe computers	18x25x 9.1	44	Forms, graphics, word processing, desktop publishing	$4,995
	QMS-PS 820	Canon TX	8	10,000	2M/3M	Diablo 630, HP Laserjet Plus, HPGL	PCL, Postscript	35	Yes	Yes	All, A4	400	RS-232, parallel, Appletalk	Macintoshes, IBM PCs and compatibles, most mini and mainframe computers	17.87 x 19.41 x 12.32	55	Forms, graphics, word processing, desktop publishing	$5,995
	QMS-PS 810 turbo	Canon SX	8	5,000	2M/8M	Diablo 630, HP Laserjet Plus, HPGL	PCL, Postscript	39	Yes	Yes	All, A4	200	RS-232, parallel, Appletalk, SCSI	Macintoshes, IBM PCs and compatibles, most mini and mainframe computers	18x25x 9.1	44	Forms, graphics, word processing, desktop publishing	$5,995

VENDOR	PRODUCT	ENGINE	PERFORMANCE (PAGE/MIN.)	SUGGESTED DUTY CYCLE (PAGE/MONTH)	ON-BOARD/EXPANDABLE MEMORY (BYTES)	HARDWARE EMULATIONS	PAGE DESCRIPTION LANGUAGES SUPPORTED	NUMBER OF RESIDENT FONTS	RESIDENT MACROS FOR FORMS	BAR CODE PRINTING CAPABILITIES	PRINTS ON WHAT TYPES OF MEDIA	MAX. SHEET INPUT CAPACITY	HOST INTERFACES SUPPORTED	WORKS WITH WHAT COMPUTERS	DIMENSIONS (H x W x D)	WEIGHT (pounds)	TYPICAL USE	BASE PRICE
QMS/Laser Connection, Inc. (800) 523-2696	QMS-PS 820 turbo	Canon TX	8	10,000	2M/8M	HP Laserjet Plus, HPGL	PCL, Postscript	39	Yes	Yes	All, A4	400	RS-232, parallel, Appletalk, SCSI	Macintoshes, IBM PCs and compatibles, most mini and mainframe computers	17.9 x 19.4 x 12.3	55	Forms, graphics, word processing, desktop publishing	$6,995
	QMS-Colorscript 100 model 10	Mitsubishi G370	1 (for three or 85 seconds for four color)	1,200	4M/8M	HPGL (optional)	Postscript	35	Yes	Yes	Letter, legal, labels, transparencies, iron-on transfers	100	RS-232, parallel, Appletalk, SCSI	Macintoshes, IBM PCs and compatibles, most mini and mainframe computers	11.34 x 16.93 x 24.84	65	Graphics, word processing, desktop publishing, color separations, color proofing, overhead presentations	$9,995
Qume Corp. (408) 942-4000	Crystal Print Super Series II	Casio	6	5,000	1.5M/NA	HP Laserjet Series II, HPGL, IBM Proprinter II, (Diablo 630, Epson FX-85 in cartridges)	PCL	10	No	No	Letter, legal, labels, transparencies	100	RS-232C, Centronics parallel	IBM PCs and compatibles	9.1 x 15.7 x 13.4	35.2	Forms, graphics, spreadsheets, word processing	$1,999
	Crystal Print Series II	Casio	6	5,000	512K/1.5M	HP Laserjet Series II, (Diablo 630, Epson FX-85, HPGL, IBM Proprinter II in cartridges)	PCL	6	No	No	Letter, legal, labels, transparencies	100	RS-232C, Centronics parallel	IBM PCs and compatibles	9.1 x 15.7 x 13.4	35.2	Graphics, word processing	$1,499
	Scripten	Hitachi	10	5,000	3M/NA	HP Laserjet Plus	Postscript	35	No	NP	Letter, legal, half letter, labels, transparencies	250	RS-232, RS-422, Centronics parallel	Macintoshes, IBM PCs and compatibles	20 x 17.25 x 15	90	Graphics, spreadsheets, word processing	4,595
	Crystal Print Publisher	Casio LCS-130A	6	5,000	3M/NA	None	Postscript	39	No	Yes	Letter, legal, labels, transparencies	100	RS-232C, RS-422A, parallel, Appletalk	Macintoshes, IIGS IBM PCs and compatibles	9.1 x 15.7 x 13.4	32	Forms, graphics, labels, spreadsheets, word processing	$4,495
Sharp Electronics Corp. (201) 529-9500	JX-9500	Sharp	6	3,000	512K/4.5M	Diablo 630, Epson FX-80, HP Laserjet Series II, IBM Proprinter, Graphics printer	PCL	6	No	NP	All, executive	250	RS-232, parallel	IBM PCs and compatibles	10.5 x 13.36 x 14.19	33.5	Forms, graphics, labels, spreadsheets, word processing, desktop publishing	$1,795
Star Micronics America, Inc. (212) 986-6770	Laserprinter 8 II	Canon SX	8	3,000	1M/5M	Diablo 630, Epson FX-800, HP Laserjet Series II, IBM Proprinter	PCL, (optional Linepage Postscript-compatible interpreter)	4	No	Yes	All, A4, B5, executive	200	RS-232C, parallel	IBM PCs and compatibles	8.6 x 17.9 x 19.4	45	Forms, graphics, labels, spreadsheets, word processing, desktop publishing, CAD/CAM	$2,799
Tandy Corp./Radio Shack (817) 390-3011	Tandy LP-1000	Ricoh	6	3,000	1.5M/2M	HP Laserjet Plus, IBM Wheelprinter, Tandy	None	52	No	No	All, A4, A5, B5	150	Parallel	Tandy and all IBM PCs and compatibles	8.13 x 16.06 x 24.94	37.5	Graphics, spreadsheets, word processing	$2,599
Texas Instruments, Inc. (800) 527-3500	Omnilaser model 2106	Ricoh 1060	6	3,000	2M/NA	Diablo 630, HP Laserjet Plus, 7475A Plotter, TI 855 DP/WP	PCL, Postscript	35	No	No	All, A4, A5, B5	150	RS-232, RS-422, Centronics parallel, Appletalk	Macintoshes, IBM PCs and compatibles	15.5 x 21.5 x 23.5	77	Graphics, word processing, desktop publishing	$4,595
	Omnilaser Model 2108	Ricoh 4080	8	10,000	2M/NA	Diablo 630, Epson, HP Laserjet Plus, 7475A Plotter, TI 855 DP/WP, Qume Sprint	PCL, Postscript	13	No	No	Letter, labels, transparencies, A4	250	RS-232, RS-422, Centronics parallel, Appletalk	Macintoshes, IBM PCs, PS/2 and compatibles	15.5 x 21.5 x 23.5	77	Graphics, word processing, desktop publishing	$5,995 (13 fonts), $6,590 (35 fonts)
	Microlaser	Ricoh	6	3,000	512K/4.5M	HP Laserjet Series II	Postscript (optional), PCL	35	No	No	All, A4, B5, Executive	250	RS-232, RS-422, Centronics parallel, Appletalk	Macintoshes, IBM PCs, and compatibles	10.9 x 13.4 x 14.2	33.5	Forms, spreadsheets, word processing, desktop publishing	$1,999
Toshiba America Information Systems, Inc. (800) 334-3445	Pagelaser6	TEC 1305-B	6	4,000	512K/4.5M	HP Laserjet Series II, IBM Proprinter XL24	PCL	8	NP	Yes	All	150	RS-232C, parallel	All IBM and compatibles	8.3 x 16.1 x 15.4	35	Spreadsheets, word processing	$1,549
Troy, Div. of Pierce Co. (714) 250-3280	Troy 308	Ricoh 4081	8	10,000	640K/NA	Diabo 630, Epson, FX-80, HP Laserjet Plus	Express, PCL	11	Yes	No	Letter, half letter	250	RS-232, Centronics parallel, coaxial	PCs, mainframes, minicomputers	13 x 21.5 x 16.5	88	Check printing	$9,700
Varityper, Inc. (201) 887-8000 ext. 999, (800) 631-2134	VT600P*	Proprietary	10	12,000	6M/NA	None	Postscript	35	No	Yes	Letter, legal, labels, transparenciés, A4, B4	200	RS-232, RS-422, Centronics parallel, Localtalk	Macintoshes, DEC, IBM PCs and compatibles, Sun Microsystems, Varityper's composition system	18.5 x 23 x 21.1	176	Forms, newspapers, technical drawings, legal and financial documents, two up printing	$16,995
	VT600W	Proprietary	10 (letter), 7 (ledger)	12,000	12M/NA	None	Postscript	35	No	Yes	Letter, legal, labels, transparencies, A4, B4	200	RS-232, RS-422, Centronics parallel, LocalTalk	Apple Computer Macintosh, DEC, IBM PCs and compatibles, Sun Microsystems, Varityper's composition system	18.5 x 23 x 21.1	176	Forms, graphics, newspapers, technical drawings, legal and financial documents, two up printing	$22,995

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Wang Laboratories, Inc. (800) 225-0654	LDP8-DSK, LDP8-SYS	Canon LBP-SX	8	5,000	512K/2M	HP Laserjet Series II	PCL	5	No	Yes	Letter, legal, envelopes	250	RS-232, parallel	IBM PC AT and compatibles (DSK), Wang VS (SYS)	8 x 18 x 31.5	50	Graphics, spreadsheets, word processing	$2,595 (DSK), $3,795 (SYS)
Xerox Corp. (800) 832-6979	Xerox 4045 Model 50	Xerox	10	15,000	1M/2M	IBM 3287 Models 1, 2	Expert, Interpress, ProCAD, Xerox ViewPoint	2	No	Yes	Letter, legal, labels, envelopes, forms	250	RS-232, Centronics parallel	PCs, minicomputers, mainframes	10.5 x 27.5 x 21.5	160	Forms, graphics, labels, word processing	$4,995
	Xerox 4045 Model 120	Xerox XP-10	10	15,000	1M/2M	IBM 3287 models 1 and 2	Expert, Interpress, ProCAD, Xerox Viewpoint	2	No	Yes	Letter, legal, envelopes, forms	250	IBM 3274/76, 3174 cluster controllers	IBM mainframe	10.5 x 27.5 x 21.5	140	Forms, graphics, word processing	$6,495
	Xerox 4045 Model 160	Xerox	10	Up to 25,000	4M/6M	Diablo 630, Xerox 2700II, HP Laserjet Plus	Interpress emulation of Postscript	42	No	Yes	Letter, legal, labels, envelopes, A4, heavy stock	250	RS-232C, Centronics parallel (RS-422, Dataproducts parallel-optional)	PCs, mini, mainframes	10.5 x 27.5 x 21.5	140	Graphics, word processing	$9,995

Printers are learning how to hatch a plot

BY STEVEN F. EDWARDS

Printer manufacturers have been chipping away for a number of years at the base of the plotter market. With speed and low maintenance in hand, they have broken into draft and check plots, leaving finishing work to conventional plotters.

Today, even finishing work is not safe from printer infiltration. The picture is changing, as more users replace or supplement the plotters that they have. This new age results from a combination of factors. One is "a propensity within both the business and engineering graphics market to have pictures embedded within textual documents," says Joel Orr at Orr Associates, a computer graphics consulting company in Great Falls, Va.

Since printers — especially laser printers — are strong in both typography and graphics, they are much better suited for handling this type of output. Also, more engineering and scientific software packages now support Adobe Systems, Inc.'s Postscript output.

A second factor is color, which is becoming more affordable on printers. Color ink-jets exist on the low end, and several color thermal-transfer printers on the high end sell for less than $10,000.

Finally, with more networks in place, there is a greater need for sharing output devices. Since printers are much faster than plotters, their throughput capability can accommodate this.

Unable to ignore this billion-dollar market, a great number of companies are offering alternative plotting solutions for engineering, scientific and business graphics applications.

Alternative choices

Most of the alternatives offer Hewlett-Packard Co.'s HP Graphics Language (HPGL) emulation, usually for the widespread HP 7475A plotter. To implement or add HPGL emulation on a printer, you have a number of choices ranging from plotting software to add-in cartridges to buying a printer with emulation built in.

If you want the flexibility to plot on almost any printer, consider personal computer software. With this software, printers look and act like penless plotters with gray-scaling, color simulation, pen fills and pen widths. Print-A-Plot from Insight Development Corp. supports HPGL emulation on all HP Laserjet and ink-jet printers, Epson America, Inc., Canon U.S.A., Inc., Digital Equipment Corp. and compatible printers. This option is also inexpensive. PC software ranges from $150 to $300.

Another way to add plotter capabilities, especially in laser printers, is with plug-in cartridges. With a price range of $350 to $600, this is a more expensive option than PC software. However, cartridges offer better performance, and they are easier to implement. They are also much less expensive than purchasing an add-in board or a dedicated plotter.

Pacific Data Products, which introduced Plotter-in-a-Cartridge for the HP Laserjet Series II more than a year ago, will soon introduce an upgraded version that also supports HP Laserjet IID and IIP printers. This version will emulate the HP 7550, HP 7475A, HP 7470 and HP Colorpro plotters.

> ESPECIALLY WITH prices dropping, it is hard to beat laser printers for throughput, high-quality one-color output and reliability.

Printer manufacturers also offer plotter functionality with resident, downloadable software or cartridge-based HPGL emulation on their printers, be they dot matrix, laser, ink-jet or thermal-transfer technology.

In general, these do not specifically target the engineering market with the intent of replacing pen plotters. "Most offer [HPGL] with a number of other features to attack a broader market base," says Steve Chirokas, output device market analyst at BIS CAP International, Inc. in Waltham, Mass.

Especially with prices dropping, it is hard to beat laser printers for throughput, high-quality one-color output and reliability.

QMS' PS-2200 Model B, a 22 page/min. Postscript monochrome printer, offers downloadable HPGL emulation. Listing at $9,995, it can print on 11-in. by 17-in. (or B-size) paper at 11 page/min., a key feature for engineering and scientific users.

For color applications, there is a growing market for ink-jet and thermal-transfer printers.

With thermal transfer, there is a price/performance trade-off. "You can buy plotters in the $2,000 to $3,000 range, while thermal-transfer printers run in the $5,000 to $10,000 range," says Carl Machover at Machover Associates, a computer graphics consulting company in White Plains, N.Y.

However, Calcomp, Inc. offers a desktop color thermal-transfer plotter/printer for $4,995. Colormaster has a built-in rasterizer, which frees the host from converting graphics and text to raster data.

While ink-jet printers are starting to replace small-format pen plotters, they are primarily used for draft output. Tektronix, Inc.'s Colorquick line includes a B-size color ink-jet with Postscript emulation. The company expects it to do well in plotter replacement applications now that it has both Postscript and HPGL emulation.

HP's Paintjet XL B-size, color ink-jet printer supports automatic sheet-feeding for unattended operation and optional HPGL emulation.

An emerging category blurs the distinction between printer and plotter. These penless plotters are designed and priced as plotters but allow users to switch into printer mode. They are based on dot matrix technology and can convert proprietary HPGL to raster languages. Two firms with these machines are Japan Digital Laboratories in Westlake Village, Calif., and Da Vinci Graphics, Inc. in Sunnyvale, Calif.

This year, we will also see another milestone in the spread of plotter functionality in printers — HPGL/2. Currently, HPGL versions vary, especially between small- and large-format plotters. Because of this, commands vary for each version, and there is no guarantee that drivers work across all products.

HPGL also does not allow users to programmatically control the additional features available in raster print images. HPGL/2 will address both of these issues, according to Dennis Mudd, HPGL/2 product manager.

All this is not to say the much-attacked plotter market is dead. Machover estimates pen plotter sales will leap from $680 million in 1989 to $1.2 billion in 1995.

However, this technology is limited in its flexibility. While plotters are unable to support more than one or two languages and cannot address raster applications, printers will only get more flexible, according to Michael Weiss at MWA Associates, a consulting and product evaluation firm in Palo Alto, Calif.

In the future, he says, it will be common for printers of many types — ink-jet, laser, thermal transfer, dot matrix, etc. — to support a variety of languages. For example, a high-end dot matrix printer may support HPGL/2, Postscript and even IBM's Graphical Programming Interface for OS/2 Presentation Manager. The user can then select any of these languages from within the application. •

Edwards is a free-lance writer and marketing consultant specializing in computer technology in Carlsbad, Calif.

Dashboards, waterfalls and spaghetti code

What you need to know about software engineering to survive in the 1990s

BY HOWARD RUBIN

Many information systems organizations view their application development options like doors in a television game show: "Should we choose door No. 1, No. 2 or No. 3?" Some prefer a single-door approach: "Information engineering with computer-aided software engineering (CASE) is *the* answer." Others take a Steve Martin (wild-and-crazy) approach, saying, "Let's open all the doors, then quickly slam them!"

But for most IS organizations, the answer does not lie behind a single door — or even several doors. Survival in the 1990s involves a skillful, intelligent blending of tools, concepts and methods suited to the task at hand.

Paul Dolan

Sifting through the current development mess can provide some important clues about future solutions. Software development is in a state of flux and confusion. Heavy demands on IS resources have derailed many software projects by uncoupling developers from users. Where James Martin predicted "applications development without programmers," many organizations are experiencing "applications without users."

Typically, today's large company is handcuffed by a portfolio of existing software applications that are old enough to vote. Worse, they are usually bound together in a spaghetti-like architecture. All this demands heavy software maintenance, diversion of resources from developing new software and improvement of the infrastructure.

Thus, it is no shock to see many organizations latch on to reverse-engineering and re-engineering tools in hopes of untangling the spaghetti and adding zest to old applications.

Unfortunately, however, business does not stand still. Even as organizations wrestle with old code, technology is transforming the very business that these aging applications are struggling to support — as are economic pressures and the resultant downsizing. The sad consequence is that as demand quickens for new systems, developers can't even keep up with the current need for older systems.

Even if they could, they lack the skills and systems needed to address new business demands. With the pace of business accelerating, the penalty for delivering projects late has stiffened quite a bit. Missed delivery dates can now make projects valueless and hapless IS managers jobless.

Faced with this developmental mess, many organizations go looking for technological solutions: CASE, structured analysis, information engineering, fourth-generation languages, prototyping and expert systems. Today's IS managers have no shortage of choices.

Unfortunately, trying to create a '90s view of software engineering by looking only at tools and techniques is similar to trying to guess the outcome of a recipe from a list of ingredients.

Being properly positioned for developing software in the '90s requires the right mix of ingredients. Specifically, IS must do the following:

- Master the new *lexicon* of software engineering.
- Understand the role of *process* in software engineering, as well as the shifts in user and IS roles as paradigms shift.
- Adopt and adapt *tools* suited to tasks at hand.
- Know the *skills and education* needed for changes in process and technology.
- Distribute *appropriate technology* effectively.
- Measure and communicate *IS contributions* to the enterprise and manage its internal processes.

Let's see how they fit together.

Waterfalls and whirlpools

The importance of knowing software lexicon is self-evident. It is like being in a foreign country: You won't get anywhere unless you know the right words.

Clearly, process will play a critical role in determining the survivors of the '90s. Some background will reveal why.

The traditional IS process has been

Rubin is a Nolan, Norton & Co. research fellow, professor of computer science at Hunter College and president of Howard Rubin Associates, Inc. in Pound Ridge, NY.

- **Tools are only a start**
- **Smart organizations take a holistic view**
- **Good metrics are key**

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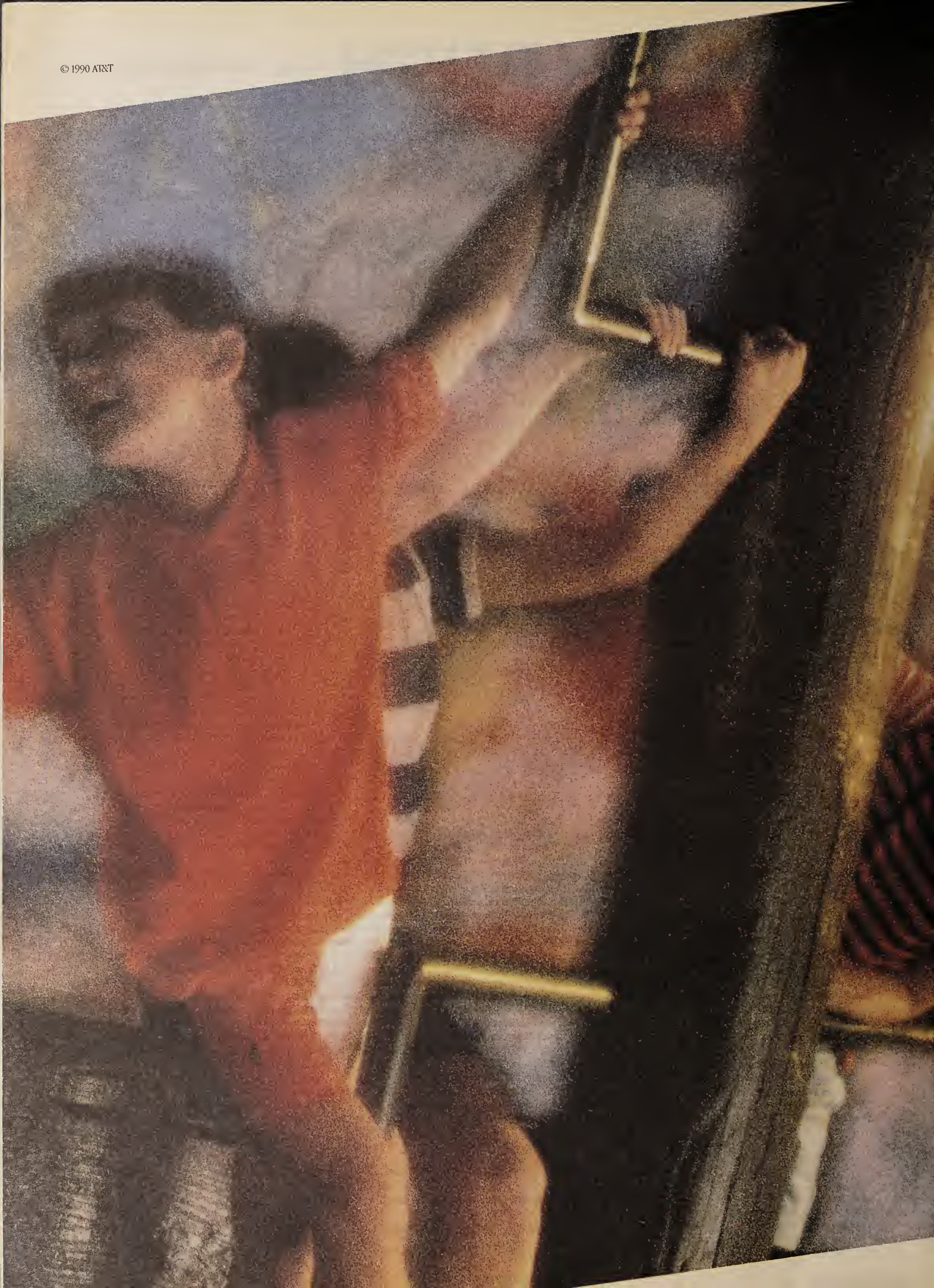

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described as a waterfall. (The analogy comes from the cascading relationship between products in one phase and the next.)

Key software development questions

Organizational level	Are we delivering? Are we evolving in the right direction? Where and how should we invest? Do our infrastructure investments pay off? Have we achieved adequate penetration of tools? How do we support the business? What is our real cost of quality?
Application level	Is it time for renovation/replacement? What is the business view of our applications? What is the technical view of our applications? Are we effective/efficient at maintaining our applications? Are our newer applications better?
Project level	Where do we spend our time? To what extent are tools and techniques being used? What are the differences between successes and failures? Are we doing the right projects?

Source: Nolan, Norton & Co.

From the viewpoint of the user (the IS customer), the waterfall offers a clear-cut way to define progress. Most users are conditioned to believe that something is "really happening" when coding starts.

However, the emergence of other life-cycle views — prototyping, protocycling, evolutionary development, information engineering, etc. — has great implications not only for the actual software development but for user communication as well. All radically change how IS relates to users and vice versa.

As dry as a technical discussion of process may seem, it holds several important implications for IS. Changes in process can mean new roles for IS professionals and users. They also mean that new measures of progress must be devised to keep management happy. And new work patterns will be necessary for those involved.

The trick is then to build a process that is both effective and easily communicated to management and users. How?

A framework for gauging software engineering capabilities has been developed by Watts Humphrey at Carnegie-Mellon University's Software Engineering Institute. Using this framework, IS can choose to improve technology, improve process or balance both.

This is a real planning dilemma. Should organizations first increase process or tooling? Both paths are fraught with danger. Organizations that build process in the absence of supporting technology only increase their inefficiency. And organizations that put tools before process jeopardize their ability to deliver products, because their technology is no longer aligned with their processes.

Fortunately, it is possible to quantitatively model development performance. Organizations can look at productivity (time to deliver), maintenance effort and ability to meet delivery commitments. Firms that plan properly can enjoy 50% faster delivery times, a 90% reduction in fix-it maintenance and will be able to meet 90% to 95% of their commitments within 10% of projected time and cost.

IS often views tools as the savior of systems developers and maintainers. However, recent studies on tool usage reveal some shocking facts:

- 70% of tools and techniques are never used.
- 25% of tools are only used by one group.
- 5% of tools are widely used but not to capacity.

In a recent presentation, consultant Michael Hammer noted that despite an "explosion of techniques, tools and technologies . . . the systems development problem has not gone away." Too often, he concluded, IS overlooks a simple but critical need: matching tools to development tasks. Another mistake is not accounting for the lack of a full landscape of development tools.

Tools and techniques used within the standard life cycle to automate tasks can yield demonstrable benefits. CASE tools benefit intertask and process automation. In fact, the whole focus of tools and techniques is shifting from individuals doing single tasks to groups sharing processes.

But the trend toward wider involvement prompts another frightening question: "Are we doomed to even more costly failures of tool acquisition?" It also prompts IS to ask: "What does effective implementation really mean *now*?"

Big productivity and quality benefits happen when 80% of the target developer audience can use a tool. For example, Cobol, unquestionably the most successful third-generation language, has a penetration of 80% to 85%.

New software jobs for the 1990s

Account managers	Senior IS developers who face off with key user sponsors to bridge the gap between business and technology issues
Business systems architects	Responsible for developing blueprints of integrated applications, databases and networks that support future business direction
Trainers	Prepare users for better utilization of existing and new systems and give them a fuller role in defining the future
Internal consultants	Provide ad hoc support at peak loading and fill skill gaps
Researchers	Identify new technologies most appropriate for the business
Product developers	Find opportunities and develop solutions for customers and clients

Source: Nolan, Norton & Co.

In contrast, the next most popular approach — structured analysis, design and programming — is used by only about 13% to 15% of the target audience, Ed Yourdon estimates. So what should the target for declaring success really be?

A twist prevents answering that question right away: Merely gauging developer use is not enough to measure effective development. Here, as in all aspects of software engineering, measurement is critical. IS must also establish *benefit* targets to monitor progress toward them. Thus, you can figure that you are approaching effective software development when 80% of the target audience is using the desired technology and achieving 80% of the projected benefits.

Technology and skills

A growing body of research, mainstream articles and a wider acceptance of "technology transfer" by both business and academia point to the coming revolution of the field as applied to software engineering.

To be successful with technology transfer, IS needs both process and technology. Software engineering winners (and survivors) of the 1990s will be those organizations that make themselves ready to effectively assimilate software engineering technology, techniques and tools.

Conceptual knowledge and abstraction will be essential for assimilating the tools, techniques and technology of the 1990s. Succeeding in this decade means building skill inventories today.

A good method of approaching the task is to consider the different types of knowledge and skills required by today's IS professional. A basic core would include the following: Programming language tools (across the life cycle and within phases); specification methods, design methods and analysis methods; testing basic technical (OS, data communications, etc.) database concepts; normalization; structured analysis; object-orientation; entities; process project management; and business/human interaction.

Opening each of the "doors" mentioned above requires different skills.

The CASE vision requires knowledge of specification, models, business knowledge and foundational concepts. The outsourced vision puts the focus on specification, business and process knowledge. The lights-out vision stretches the concepts of abstraction, modeling and concepts. The architecture-based vision demands skills that integrate business and technology.

Crucial to all these visions will be a keen grasp of "assessment." This refers to the ability of information systems professionals at all levels to evaluate their progress on projects, personal growth, contribution to the enterprise, productivity and product quality.

Because such assessments are grounded in solid measures, knowing how to apply and interpret metrics is key.

Measurement has always presented a dilemma in the IS world. The single-metric syndrome (silver bullet) can be traced to measurement "folklore" that has propagated a number of basic design principles: Choose a good measure, choose good projects and get management

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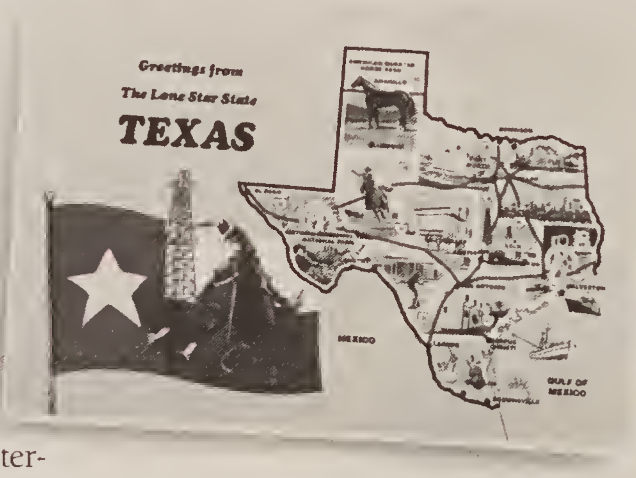

Artwork Courtesy of The Texas Postcard Company © 1989 support. This "bottom-up" approach is a recipe for failure.

Today's systems world is choked with methodologies. What is sorely lacking, though, is a program design method that focuses on providing appropriate design measures. Function points could be one of the right measures for the '90s but in a limited context.

The ideal measurement program design must be robust enough to satisfy both IS and business needs.

A key concept for implementing a metric program is the idea of a measurement "dashboard." The dashboard concept is based on the idea that all organizations must have information available to them in 10 basic dimensions: productivity, quality, delivery, penetration, work profile, demand, technology assimilation, work distribution, capability and business orientation (see story this page).

IS staff members can reasonably look at 10 vital areas to measure its organization, projects and applications. Depending on company focus, gauges of varying sensitivity are used.

How do we sum it up? Focus on people, measurement, better tooling and process. Contain maintenance so you can focus on new development and technology. Track your process evolution, set targets for it, drive it and measure it. Communicate your contribution to the business. Use metrics to guide yourself to process improvement. Most important, make sure your IS group is ready.

The biggest challenge of the 1990s, however, is a business challenge. To date, IS has focused on relating input to output. However, only by relating outcome — not output — to input will the value of information systems be apparent to business. The challenge then is to relate today's outputs to favorable business outcomes. Survivors will learn to do this; winners will do it first. •

Ten basic metrics

A well-conceived "dashboard" for measuring information systems organizations, projects and applications should include the following gauges:

1) **Productivity metrics** that deal with the rate of delivery of software and the ability to support software.
2) **Quality metrics** that deal with the technical quality of the software and how it will meet business needs. They also gauge quality of the software-engineering process.
3) **Delivery metrics** that deal with the organization's ability to meet time and cost commitments.
4) **Penetration metrics** that deal with the extent to which tools and techniques have been successfully disseminated.
5) **Work profile metrics** that deal with the "shape" of work as it progresses through the life-cycle stages in terms of effort and elapsed time.
6) **Demand metrics** that deal with request backlogs and the ability of the organization to service them.
7) **Technology assimilation metrics** that deal with the organization's ability to adopt and assimilate promising new software engineering technology.
8) **Work distribution metrics** that deal with the balance between maintenance and development.
9) **Capability metrics** that deal with the overall ability of the IS organization to manage, measure and improve itself (software engineering process quality).
10) **Business-oriented metrics** that link IS functioning to the success measures used by the business to gauge business performance.

—HOWARD RUBIN

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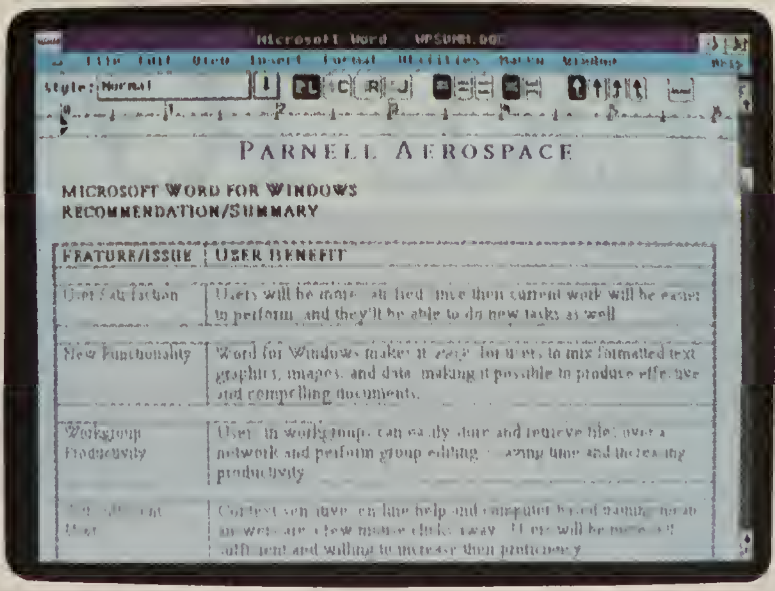

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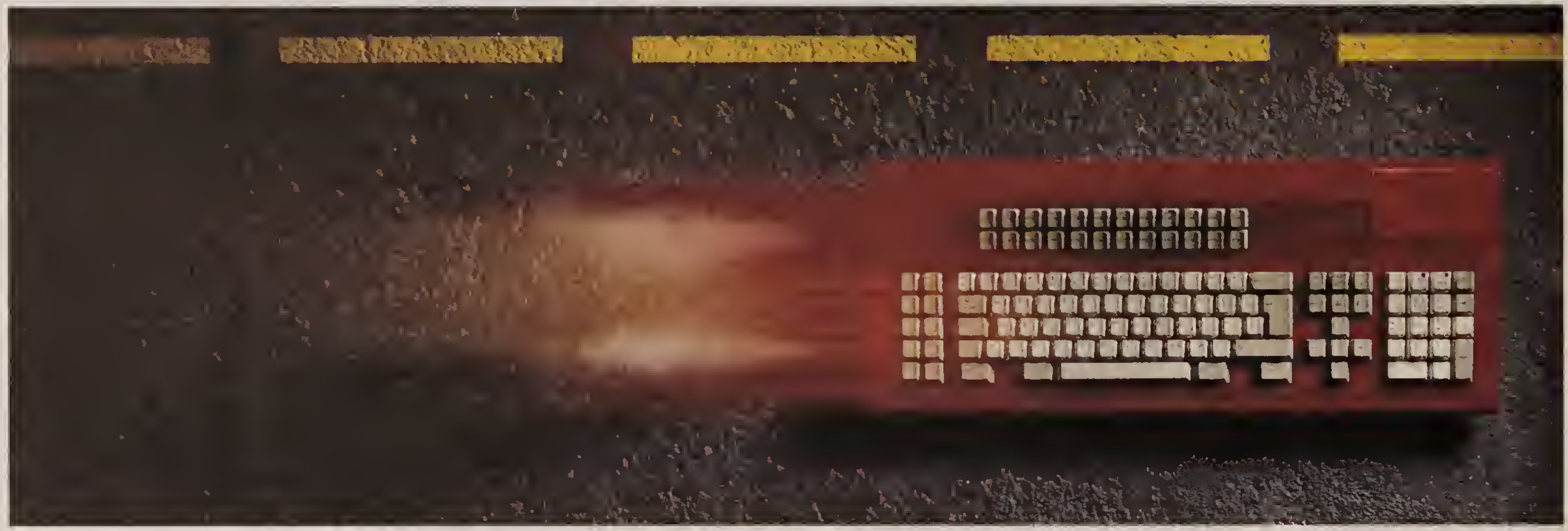

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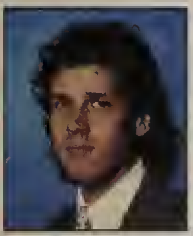

Nothing surprises me anymore. Chunks of the Berlin Wall are hawked in plush department stores; I don't blink. TV ads that warn against frying your brain sunny-side up on drugs run alongside beer commercials in which the act of twisting open a Budweiser begins a party crammed with swaying palms and bikini-clad dates; nothing startling there. Heck, if I saw Philippe Kahn waltzing through an Ultra Slim-Fast advertisement, I wouldn't bat an eye.

Yet the recent Apple shareholder meeting left me shaking my head. No, it wasn't the fact that muckamuck Jean-Louis Gassee cursed freely at reporters. Nothing new there. It happened after Chief Executive John Sculley went into an extended session of verbal gymnastics defending plans for Apple's first layoff in five years. Sculley conceded that profits are down and domestic business stinks, so needless expenses must take a hit. Fair enough: Laissez-faire economics can be an awfully icy swim at times.

A few rows back from his podium, I was thumbing through

Continued on page 119

Congress takes on RBOC battle

Rep. Markey's draft bill would loosen some of the Baby Bell restraints

ANALYSIS

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — After several years of hearings and false starts, the legislative battle to free the seven Baby Bells from the constraints of the AT&T divestiture settlement has begun in earnest.

U.S. Rep. Edward J. Markey (D-Mass.) unveiled a preliminary draft on Feb. 9 of the Telecommunications Policy Act of 1990, a bill that gives the regional Bell operating companies (RBOC) a partial entry into the equipment manufacturing and information services markets that are now off-limits to them.

For example, the draft bill would allow the companies to offer electronic Yellow Pages, design telecommunications hardware and write switching software. Actually manufacturing hardware, however, or generating the content of information services would be prohibited for 10 years.

The proposal adds several consumer and competitive safeguards and gives the Federal Communications Commission — instead of U.S. District Judge Harold Greene — authority over the Baby Bells'. new business ventures.

The draft bill is a consensus document developed by key Democratic and Republican staff members serving the House Subcommittee on Telecommunications and Finance, which is chaired by Markey. However, it faces an uncertain future in the full House and Senate, mostly because of fierce opposition from the nation's newspaper publishers, which fear that monopoly telephone companies will have an unfair advantage in the electronic information marketplace.

Flood of comments due

Written comments on the draft bill will be pouring in during the next three weeks and subcommittee hearings are planned for early March. The Senate appears less interested in the issue, although Sen. Ernest F. Hollings (D-S.C.) has introduced a bill lifting the manufacturing restriction.

In the House, the support of Rep. John D. Dingell (D-Mich.), the powerful chairman of the House Committee on Energy and Commerce, is crucial. He is primarily interested in having Congress and the FCC, rather than an unelected judge focusing on antitrust matters, control U.S. telecommunications policy.

"Judge Greene is a good man in a bad place, and I think the staff draft will move us in the right direction," Dingell said in a statement.

James F. Rill, assistant attorney general for antitrust, said the Bush administration does not have a position on the legislation, although the "complexity of the dual-regulation format is under review."

The RBOCs have been clamoring for greater freedom for several years and have amassed a war chest — reportedly $21 million — for their 1990 lobbying campaign.

In addition to the American Newspaper Publishers Association, opponents of the bill include MCI Communications Corp., which fears the RBOCs will get into long-distance service. At the Communication Networks '90 conference earlier this month, MCI Chairman William G. McGowan said he doubts the legislation will pass because there is no ground swell of support from the user community. "It seems to be a ground swell of seven companies," he quipped, although he later acknowledged

Continued on page 119

Terms of release

The draft bill released by the House telecommunications subcommittee has the following provisions affecting the regional Bell operating companies:

- The companies may provide previously authorized information services, plus electronic Yellow Pages. Generation or alteration of information content is prohibited for 10 years.
- The companies must implement Open Network Architecture (ONA). The Federal Communications Commission must revise its ONA order to provide further unbundling of network functions and reasonable uniformity among the seven operating company regions.
- The companies may provide any information service outside their respective regions.
- The companies may engage in research, design and development of telecommunications equipment if performed by a separate subsidiary.
- They may create switching software, but fabrication of the hardware is prohibited for 10 years.
- Waivers to provide interexchange signaling interfaces and statewide information-service gateways will be permitted.

MITCH BETTS

Inside

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- Fuzzy logic wins sketchy support in U.S. Page 114.
- HP rings in Consultline. Page 118.

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Grading high-tech teaching

Computer-based training is slowly finding a place for itself in business

BY ELLIS BOOKER
CW STAFF

Despite a host of frightening questions raised by the well-documented U.S. education deficit and a wealth of possible technological answers, only a small fraction of the $30 billion U.S. companies spend annually on formal skill improvement or remedial instruction goes to promising new technologies such as computer-based training (CBT).

The CBT niche has grown slowly, according to market observers. One critical reason is that companies still are not sure what kinds of technologies — from seminars broadcast over the company's videoconferencing network to interactive video workstations — are best for teaching workers. In addition, commercial computer platforms have only lately become powerful enough to support sophisticated, often multimedia training software, several analysts said.

Another obstacle has been justifying the cost of innovative, computer-based delivery systems.

"The classroom is the cheapest form to design but the most expensive to deliver. The workstation is cheapest to deliver but costliest to design," said A. William Wiggenhorn, president of Motorola University, the expanded training operation that Schaumburg, Ill.-based Motorola, Inc. launched last month [CW, Jan. 15].

According to the American Society for Training and Development (ASTD) in Alexandria, Va., U.S. companies spend about $30 billion — or about 1.5% of their payroll — on formal employee training annually. While few of the dollars currently go toward computer-based training, the ASTD believes that situation is about to change (see chart).

However, Gloria J. Gery, an independent consultant in business learning and performance support and author of *Making CBT Happen*, cautioned that the surveys of CBT use can be deceptive.

"There's no way to get a good handle on the penetration of CBT because the function is so distributed," she said. "The 'training department' may be unaware of the uses of software going on elsewhere in the company."

Most observers agree that the largest category for CBT today is programs that teach users how to operate computers or specific applications, Gery said. She predicted, however, that the technology will "fan out to other areas," once workstations become more powerful.

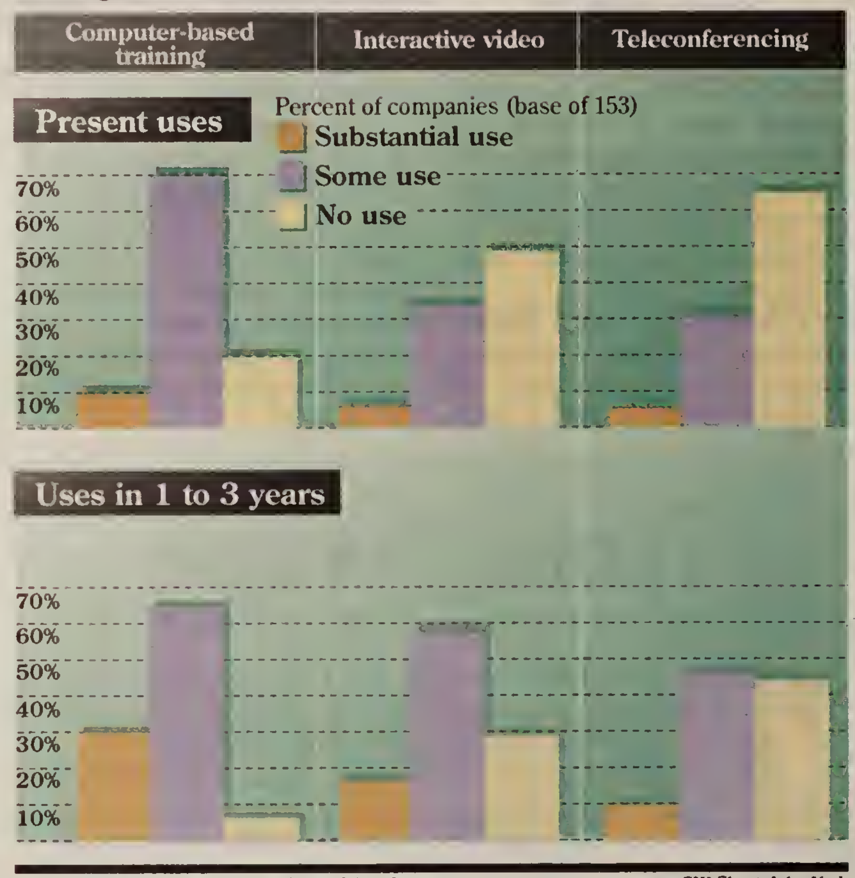
With the widespread availability of more powerful workstation platforms, she said, innovation will be possible provided corporations "break old conceptual models" about where learning should take place.

Rather than remove workers for a few hours or days of instruction, the most effective kind of teaching, she said, is always in context — ideally, in the context of a task to be completed. One category of training systems that has not only generated excitement among researchers but has already found a place in some companies' training departments is interactive video.

Roger C. Shank, director of the recently established Institute for the Learning Sciences in Evanston, Ill., is a strong proponent of the use of video in corporate training.

Tech teachers

Training technology will be on a usage upswing during the next three years



Source: American Society for Training and Development

CW Chart: John York

One project by researchers at the institute, which was created last year as a joint effort between Northwestern University and Chicago-based information systems consultant Andersen Consulting, involves 250 three-minute video "stories" from one Andersen Consulting partner. The stories, which are indexed according to their content, are linked to a natural language interface, allowing the user to navigate through a subject based on his interests and questions at the moment.

"One of the things we've realized in the last few months is that we really are in the video-interface business," said Shank, who predicted that much of the institute's work will involve "building very large video databases with lots of different kinds of interfaces — natural language queries, games and simulations."

Shank disparages the approach of most instructional software, which he said often does little more than put the text from the paper training guide onto a CRT. Although he said he believes corporate America is marginally ahead of the school systems and that it has made large investments CBT, "it is by and large an institutionalization of what goes on in schools anyway. It's question-answer, question-answer. It's put on a computer. Congratulations."

While not an artificial intelligence-based simulator, the Simulation System Trainer, from Westport, Conn.-based Performax, Inc., illustrates the benefits of adding video.

The 4-year-old system is said to simulate an interaction between trainee and an on-screen "customer," allowing sales trainees to practice new skills through role-playing.

Using a video camera mounted above the monitor, the student is filmed interacting with the customer segments, contained on a laser disk. The interface is an IBM Info-Window monitor with a touch screen. The final tape merges the student's and customer's responses for review.

Ottaway Newspapers, Inc. in Campbell Hall, N.Y., began using the system last September at two of its newspapers in order to train advertising sales staff.

Ironically, a cultural bias for classroom instruction may mean that innovative teaching approaches will not be used to train the corporation's top people.

"Very few upper management types are playing on simulators," Gery said. Today, she said, top management gets to meet the "teacher" at the seminar or briefing. Less important employees get so-called secondary sources: a videoconference, a video tape or a book.

The future is uncertain for U.S. fuzzy logic

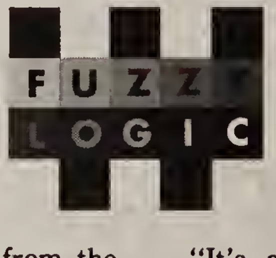
BY J. A. SAVAGE
CW STAFF

Fuzzy logic — the umbrella term for the theories that allow shades-of-gray information to be processed by computers traditionally geared to exact, yes-or-no logic — has been largely ignored by U.S. funding organizations for 25 years. During that time, other countries, particularly Japan, have made the development of fuzzy logic a priority, leaving U.S. development in the dust.

Japan has recently commercialized several products based on fuzzy logic — train and elevator controls, automatic transmissions and autofocus cameras. U.S. companies have no such finished products. In fact, few companies have even shown interest in commercializing fuzzy logic, with the notable exception of Togai Infralogic in Irvine, Calif., which produces a fuzzy processor for imbedded use and whose products are currently sold only in Japan.

Lofti Zadeh, professor of electrical engineering and computer sciences at the University of California at Berkeley, is considered the father of fuzzy logic. Zadeh, who first theorized about fuzzy logic and also coined the term for it 25 years ago, bemoaned the lack of interest in his work on the parts of the very government agencies that are traditionally the major supporters of new technology.

"The National Science Foundation rejected grants [for funding fuzzy research]. In doing so, they said these theories have no promise of practical application," Zadeh said. Not only have proposals been turned down, but adherence to fuzzy theories has ruined some mathematicians' careers, he said. "Imprecise thinking raises all sorts of hackles. Some [other academics who adhered to it] could not get jobs, not get grants and were not promoted," he said.



Zadeh has noticed a change in attitude from the agency since Japanese companies started making tangible products available, but it is still not giving grants with open pocketbooks.

The NSF does not have a bias against fuzzy logic, but some of the proposals it receives are not "well-conceived," said Y.T. Chien, the NSF's division director for information robotics and intelligent systems. Fuzzy logic proponents, he emphasized, are not singled out for rejection. "We turn down three of four proposals," he said.

John Dockery, a senior analyst at the Command and Control Section of the Joint Staff at the Pentagon, has been trying to convince the military for 17 years that fuzzy logic has "widespread military applications." He said that the theory's controversial nature scares away established agencies.

"It's a controversial topic, and funding agencies and engineers tend to avoid controversy," Dockery noted. Resistance to the imprecise nature of fuzzy logic, he added, runs so deeply that "the arguments become theological, not technical."

More doubters

Another prime funding agency, the Defense Advanced Research Projects Agency (DARPA), also appears to be skeptical of fuzzy logic research.

"DARPA has funded some, but it always has a lot more proposals than money to give out," said Allen Firstenberg, director of information science at the Rockwell International Science Center in Thousand Oaks, Calif. He added that the interests of DARPA have not necessarily coincided with those of fuzzy logic proponents. Firstenberg himself has a proposal pending before the agency.

Like his NSF counterpart, Firstenberg noted that fuzzy logic is still controversial among scientists; some at DARPA also tend to avoid controversy, he added.

Although its Ministry of International Trade and Industry established a high-profile laboratory in March 1989 to develop theory and products, Japan has not cornered the market on fuzzy logic. The USSR and China, for instance, both are stong in academic research — with their governments' backing.

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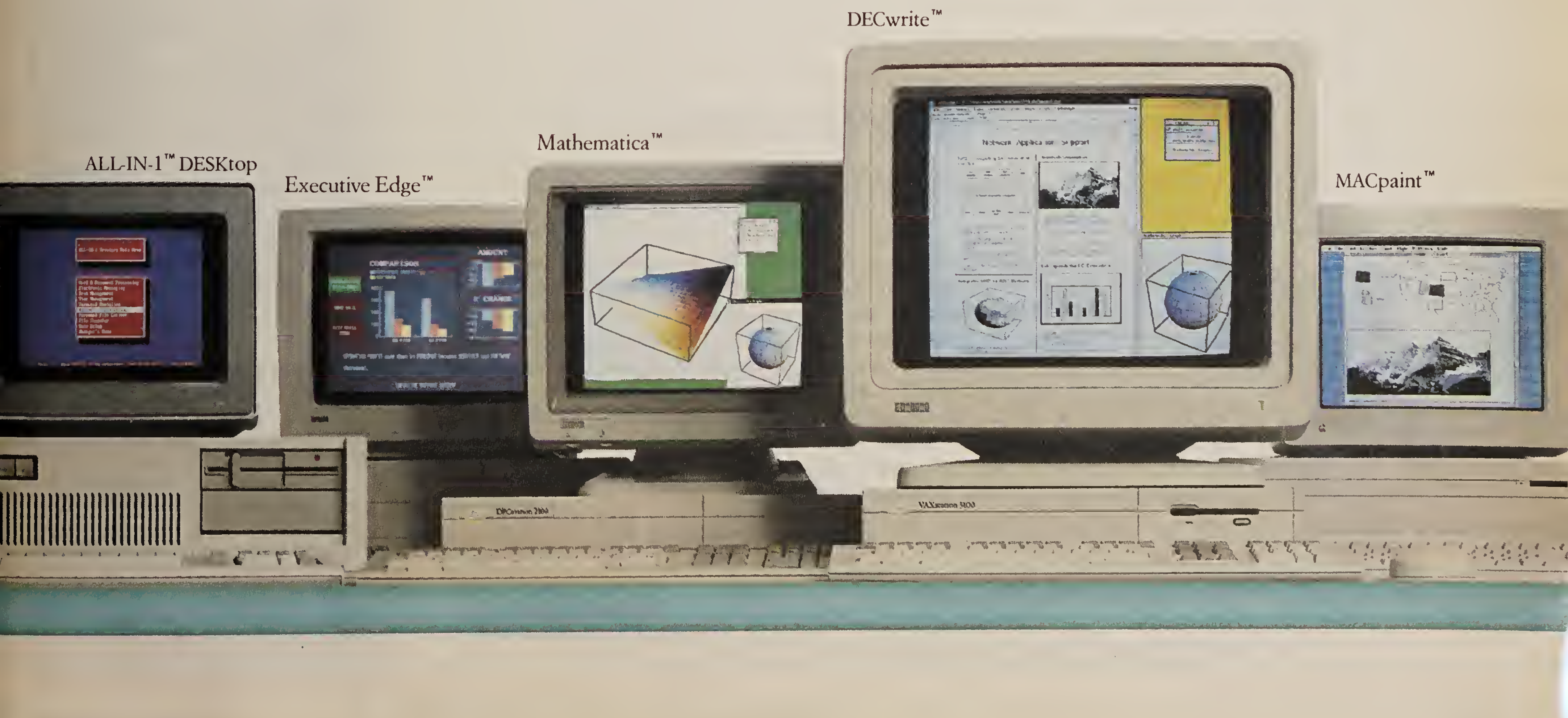

Facing weak sales, HP adds service

BY J. A. SAVAGE
CW STAFF

Following a trend among vendors, Hewlett-Packard Co. is expanding its consulting and systems integration business with a new offering called Consultline, the company announced earlier this month.

Consultline will offer two main services: one to customize projects and the other to offer one technical solution to many of the same type of customer, according to the company.

IBM and Digital Equipment Corp. are already offering similar services, which compete with the offerings of independent consultants. Analysts said that the widespread focus on service is an attempt to bring in revenue to offset a projected decline in revenue.

"The industry is looking at a weak year in 1990. Service is an area in which they can get revenues up while manufacturing is down," said John Girton, vice-president of research at Van Kasper & Co., a brokerage investment firm in San Francisco. He added that growth in the service area, compared with the rest of HP's growth, has fallen off in the last three years.

"Either HP gets into [systems integration] or it leaves money on the table — money that will go to other consultants," said Bonnie Digrius, an analyst at Gartner Group, Inc. in Santa Clara, Calif.

According to Lori Kleinman, an analyst at the Ledgeway Group in Lexington, Mass., the service sector of the industry will grow by 20% in the next four years.

One user interviewed recently looked favorably on the expansion but does not expect it to replace independent consultants. "It gives us another place to go, but there will still be many occasions where an independent consultant is preferable," said Charlie Hamlett, vice-president of information systems at La Quinta Motor Inns, Inc. in San Antonio, Texas, which uses HP's personal computers. He said he may use the service but would feel more comfortable with a second opinion to avoid bias.

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IN BRIEF

Hungary for those good things

No sooner has the iron curtain come down in Hungary than **Digital Equipment Corp.** is opening its doors there. Early April is the slated date for operations to start at Digital Equipment Hungary Ltd., a joint venture between the world's second-largest computer company and two Hungarian engineering organizations, DEC announced last week. The new company will initially target DEC's Microvax family at nonsensitive commercial and national infrastructure development areas such as economics.

. . . .

Black is black

DEC-based storage subsystem vendor **System Industries, Inc.** last week reported net income of $276,000 for its second quarter of fiscal 1990 — the company's first profit since the quarter ended July 24, 1988. President Paul Emery II credited the company's move into the high-performance workstation area as largely responsible for the long-awaited return to black ink.

. . . .

Papa's got a brand new bag

Computer systems and services giant **Computer Sciences Corp.** last week announced its plans to expand into the financial insurance services arena with the acquisition of Dallas-based financial insurance software provider **Logic, Inc.** Twenty-year-old Logic, according to CSC, has enjoyed revenue growth of 40% in each of the past three years to a current $17 million in revenue under President Winston R. Kimzey.

. . . .

My funny valentine

As V-Day neared last week, **Archive Corp.** fired off a letter urging acquisition target **Cipher Data Products, Inc.** to say yes. If a friendly merger doesn't emerge soon, said Archive, now into its ninth week of wooing, its tender offer could turn tough. Cipher, reportedly seeking a white knight, has yet to propose an alternative to what appears an increasingly likely Archive takeover.

. . . .

Good day, sunshine

The University of North Dakota's UND Aerospace Foundation and **Control Data Corp.** are joining forces to form a for-profit venture to develop and market applications for CDC's Amigas II (Advanced Meteorological Image and Graphics System) — a 2-year-old system primarily sold to weather bureaus. The new company will target the estimated $400 million weather-related information systems market.

Daly

CONTINUED FROM PAGE 113

some Apple financial documents from the past year when my head bobbed sharply.

Get a load of these numbers: new Chief Financial Officer Joe Graziano got a $1.5 million signing bonus and will get his $600,000 yearly salary (plus bonuses) for the next four years, whether or not he's with Apple. Yow.

Sculley's drone about job cuts continued in the background as I read further: Golden parachutes are also in place for Senior Vice-President of Apple USA Sales Bill Coldrick ($2.1 million) and Networking Vice-President Don Casey ($1.2 million). And ex-Senior Vice-President of Sales Charles Boesenberg was allowed to walk away from his interest-free $200,000 company loan after a payment of $66,667.

How is it possible to stitch together such an elaborate series of financial safety nets and yet freely profess to combat needless expenses?

Although Sculley later admitted that he wasn't too keen on the practice of golden parachutes and signing bonuses, he defended them as a necessary evil in certain cases to get the quality of employee needed. Sculley said that of the 10 jillion accountants in the U.S., only Joe Graziano fit the bill for the Apple position. And ol' Joe, well, he needed a little buttering up.

Yeah, I know what you're thinking. A million here, a million there isn't much in the general scheme of things. But let's put those numbers in human terms — especially now, in the face of layoffs that are expected to total 500 or more. Let's assume that a typical Apple worker makes $30,000. We'll also add in $5,000 in bonuses and benefits.

Using that measure, the elimination of Graziano's bonus could save the jobs of 43 workers. Coldrick's $2.1 million golden parachute cost 60 jobs, and Casey's little good-bye sandwich is responsible for the loss of about 34 jobs. Boesenberg gets off easy. Boesenberg's nonpayment of $133,333 on his loan only cost four pink slips.

All totaled, five men are walking around with 141 jobs in their pockets. That's more than one-quarter of the workers expected to be let go. Further extrapolation reveals 141 rent and mortgage payments thrown into jeopardy, dozens of inflated bar tabs and thousands of sleepless nights. And Sculley & Co. wonder why the company has so many internal leaks.

So if you're an Apple worker who happens to receive a pink slip during the next few weeks, make sure to stop off and say good-bye to John Sculley, Joe Graziano, Bill Coldrick and Don Casey. Remember, it's your money they're spending.

Daly is a *Computerworld* West Coast senior correspondent.

RBOC

CONTINUED FROM PAGE 113

that "if Chairman Dingell supports something, that is a ground swell."

McGowan said the bill's supporters are "clearly too young to remember 1982," when the regional Bell operating companies were charged with anticompetitive behavior and then agreed to the line-of-business restrictions.

Two members of the House telecommunications subcommittee told the conference that lifting the information services restriction will be the most difficult item because of opposition from newspaper publishers.

Reps. Michael G. Oxley (R-Ohio) and Jim Slattery (D-Kan.) called the publishers' association the "800-pound gorilla" in the debate. Most members of Congress are not experts in telecommunications, and "they don't want to vote against their local newspaper" for fear of retaliation in the news and editorial pages, Oxley said.

Slattery speculated that the telephone companies will lose the debate with the publishers unless they provide the U.S. public and legislators with a compelling argument for change.

Members of Congress "need to be able to explain their position when they stand up at the Rotary Club and explain it in one minute on the local [TV] news. Until that threshold is crossed, there won't be a majority vote" for relaxing the information services restriction, Slattery said.

EXECUTIVE CORNER

Bell & Howell finds new CEO

Bell & Howell Co. has named **William J. White** as chairman, president and chief executive officer. White, formerly president of Whitestar Graphics, Inc., will replace Chief Financial Officer Nils Johansson, who has been serving as interim chairman of the Skokie, Ill.-based information services and publishing company since the resignation last September of CEO Gerald E. Schultz.

Mountain View, Calif.-based Unix software vendor **Hunter Systems** has a new president and CEO, former Ashton-Tate Corp. software products executive **Roy E. Folk**. Folk takes the reins from company founder Colin Hunter, who will remain as chairman of the board.

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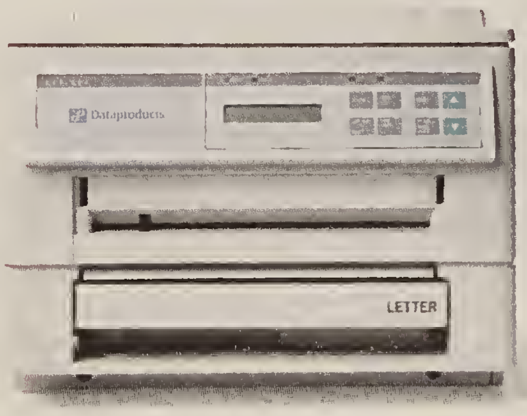

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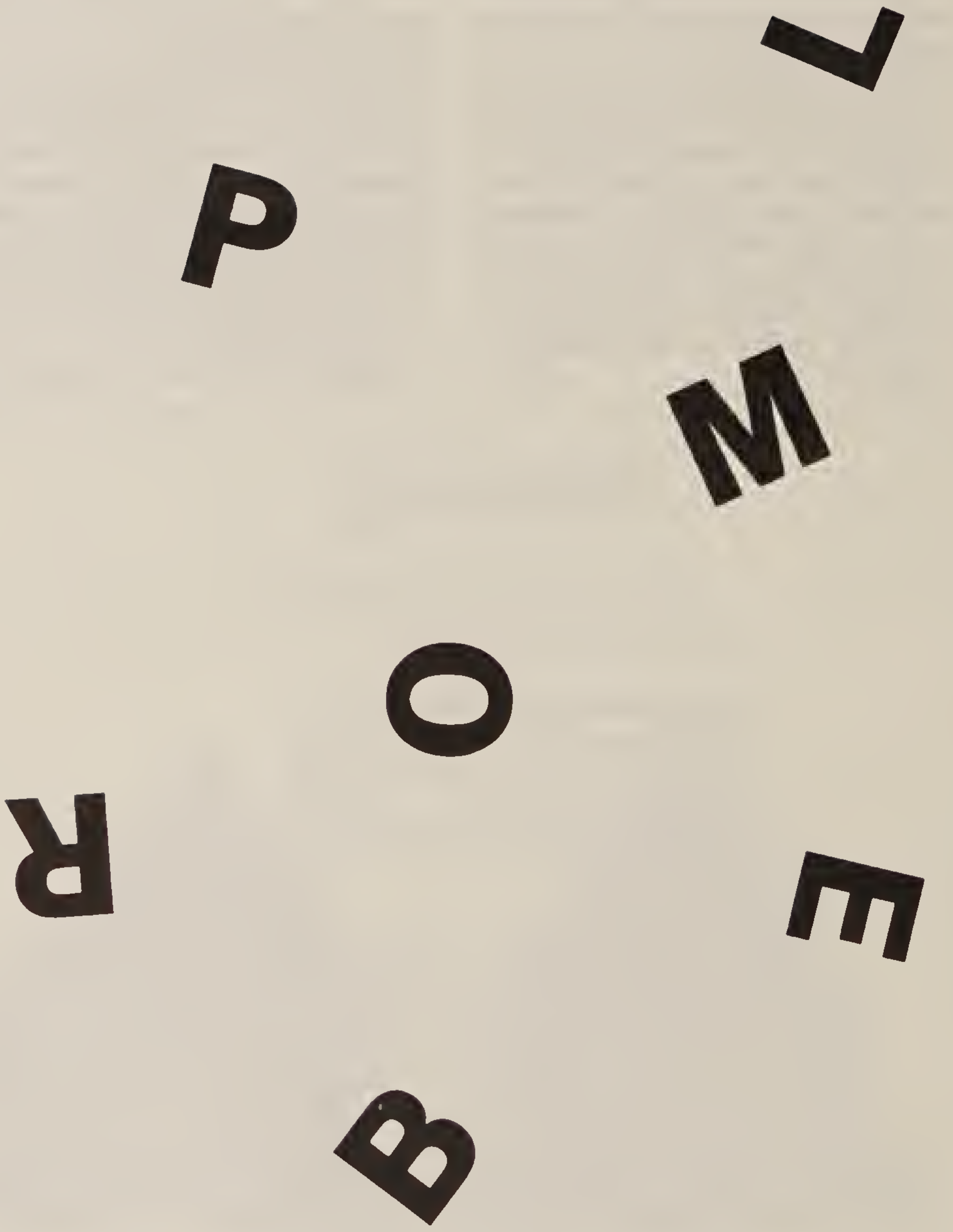

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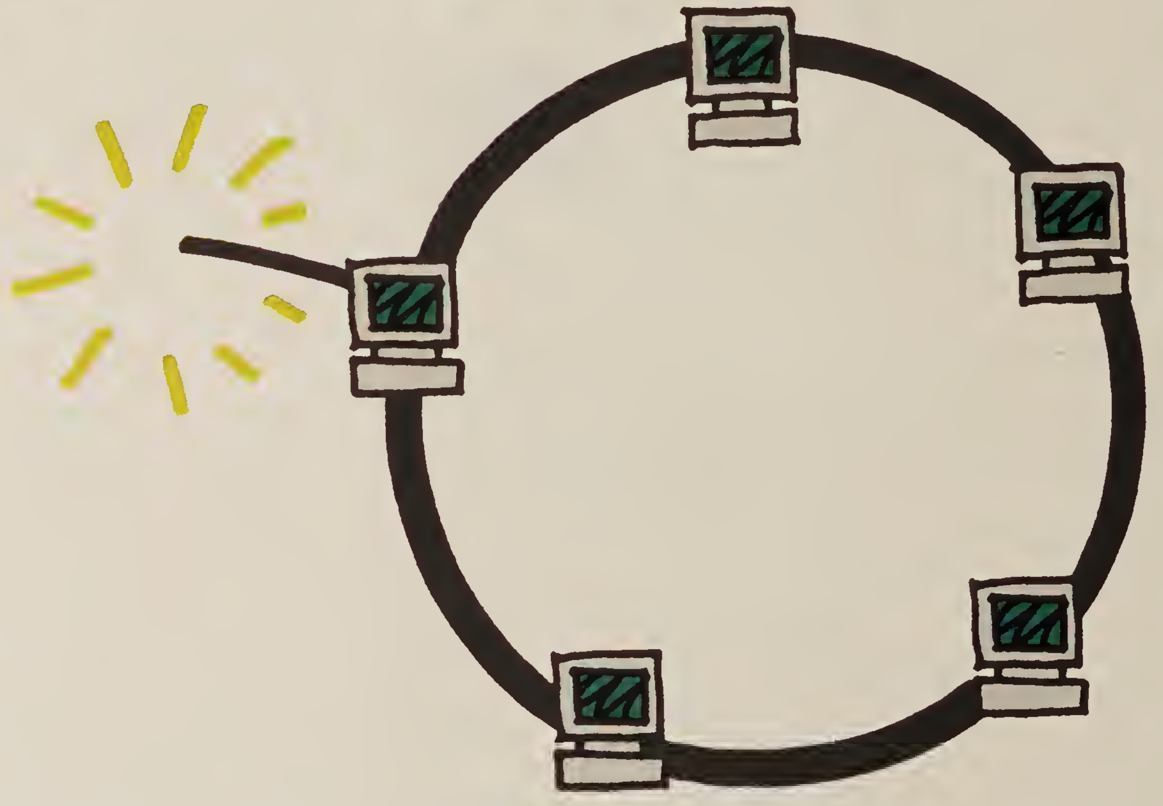

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AI: Techies need not apply

In expert systems, inventiveness and communication are what counts

BY ALICE BREDIN
SPECIAL TO CW

Twenty years ago, conventional wisdom held that becoming a doctor or lawyer endowed one with prestige, a good salary and guaranteed employment. In the 1990s, the field of expert systems may share those distinctions.

Corporate managers say these rewards aren't likely to be reaped by the technological gurus who have pioneered expert systems and other branches of artifical intelligence. The importance of specialized degrees is diminishing as some of the fields, especially expert systems, become more mainstream.

Increasingly, what counts in expert systems is personality and analytical ability. Managers say they need individuals who can extract information from people and evaluate it to solve problems, while specialized languages and programming shells can be learned on the job.

"It's in a different stage now; people are over the initial hype, and they are finding practical applications," says Harry Wallaesa, vice-president of MIS at Campbell's Soup Co. in Camden, N.J. "There had been a lull until technology caught up with the hype and the prices dropped."

Throughout the U.S., major corporations — particularly in manufacturing, banking and insurance — are intensifying their search for people to develop expert systems. Demand for these professionals is expected to grow 15% to 20% per year for the foreseeable future, according to Edward Perlin Associates, Inc., a compensation consulting firm in New York.

One reason for the demand is that big corporations that have used consultants to advise them about expert systems have decided they need an in-house staff, says David Blanchard, editor of the magazine *AIWeek*. "In the last year, the number of positions has doubled or tripled," he says.

The supply of qualified professionals falls short of this demand, putting upward pressure on salaries. There are very few good people and a lot of companies that want them, says Peter Murphy, second vice-president in the information systems department of The Travelers Corp. in Hartford, Conn. "There is more money to be gotten out of it than in most IS positions."

Salaries for professionals at major corporations range from $40,000 to $90,000 a year, depending on one's level of experience. Consultants generally can make more money, anywhere from $600 to $1,200 per day.

Despite the growing demand for expert systems professionals, some managers responsible for hiring them say there is limited growth potential in the field. The reason, they say, is small staffs handle the function best.

That's particularly true in the case of natural languages, another branch of artificial intelligence. At Citicorp in New York, a unit that develops natural language systems for extracting information from unstructured messages finds projects are best handled by one or two people, says Gregory Parkinson, who manages development for transaction and trade transfer systems at the banking company.

Parkinson's group has expanded from one person two years ago to five today. He expects it to grow only slightly in coming years.

On the other hand, Travelers has increased the number of its expert systems people to 50 since it began adopting the technology five years ago. In the next five years, the area should grow even faster, Murphy says.

He and other managers emphasize that there are jobs for people with the right skills, knowledge and disposition, including the ability to communicate verbally, some basic technological know-how and an inquisitive nature.

In the development of expert systems, good verbal communication enables the extraction of insights from experts, such as insurance underwriters. "The AI people are in the business of knowledge acquisition, talking to experts to get information," Murphy says.

> INCREASINGLY, WHAT COUNTS in expert systems is personality and analytical ability. Managers say they need individuals who can extract information from people and evaluate it to solve problems, while specialized languages and programming shells can be learned on the job.

Managers seek people with an understanding of one or more of the basic programming languages — the most commonly used is LISP — and one shell. However, many companies are willing to train people in these areas.

"I hire people who are innovative and have the potential to enhance their skills," says Wallaesa. "The people who are most adept at new technology are the ones who are interested in it and will take the time to learn it, on their own or through training."

Parkinson says all his staff members had some experience in artificial intelligence when he hired them, but that a Ph.D. is not the kind of person he wants because the academic approach is different from Citicorp's. The academics are oriented toward the realization of AI theory while the banking company is geared toward results — reducing problems to a more manageable form, he says.

Other managers take a similar tack. It used to be that Ph.D.s were good for lending credibility in artificial intelligence, especially for consultants, says Mark Helfand, an account executive at March Associates, a recruiting firm in New York.

Today people with a Ph.D. are still sought by research departments of major corporations. Other organizations, especially consulting firms, are looking for individuals more oriented toward solving a client's problems, which puts a premium on interpersonal skills, Helfand says.

Bredin is a free-lance writer based in New York.

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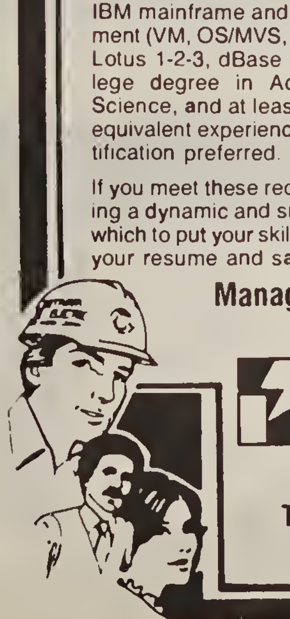

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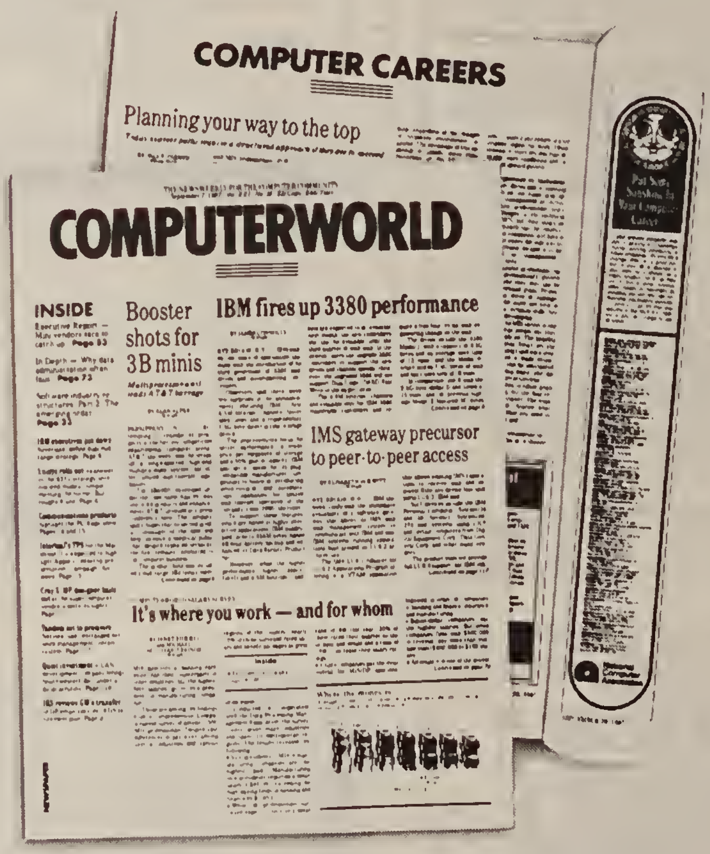
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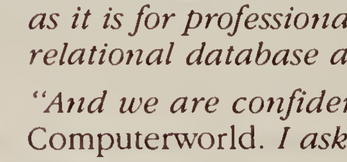

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Taking a 4GL for a test drive

Buying one calls for checking out its levels of comfort, speed and power

BY JESSICA KEYES
SPECIAL TO CW

Fourth-generation languages (4GLs) have been around for more than a decade. Back in 1982, James Martin boasted a 10-to-1 productivity gain when 4GLs were used rather than conventional programming languages such as Cobol. Today, with bigger and more powerful processors and a plethora of links to personal computers and workstations, the concept of these intuitive languages is even more appealing.

Basically, 4GLs are nonprocedural languages that can be used by either information systems professionals or end users. Users don't have to write file definitions or follow other rules of syntax required by procedural languages such as Cobol, so they can get by writing fewer lines that are composed with greater flexibility.

Not all 4GLs are alike. For those of you who are looking for a set of criteria to help in selecting one, the first issue to consider should be user-friendliness. Syntax such as "table file employee print salary by name end," for example, is less alien than:

"Select
From employee
Order by name, salary
Print."

There are a host of other criteria to examine. High up on the list is system performance. Is the language in question a purely interpretive one or can you compile it? The ones that don't come with a compiler must be interpreted line-by-line as they run — and users wait. Does the language contain an optimizing utility to speed it up? Even delays in nanoseconds eventually become apparent with a large number of users.

Perhaps the best tactic you can employ is to bring a 4GL in-house for a trial and diligently test it against your trusty third-generation languages. This is what I did when I was asked to select a 4GL for the New York Stock Exchange. We concocted a complex inquiry using Cobol and devised the same inquiry using Ramis, a 4GL. It turned out that Ramis was no more or less efficient than Cobol.

Some people marvel at the speed of the 4GL they've selected, but they omit one crucial test of its capabilities in this area. A 4GL can perform what is known as a join. A join is really an inquiry that intersects two discrete files or databases to produce a third file or a report. You may want to see how fast the product can perform one.

While you are playing around with databases, you will want to make sure the product can access the ones you use. If it won't support all of your files, ask the next question: Can you write your own exit to support your unique file yourself?

For example, the New York Stock Exchange uses Innovation Access Method files rather than VSAM files. Ramis did not support this file type. But through a user-defined exit, we were able to create our own interface module.

This interface relates to another selection criteria — namely, links to third-generation languages. Can your 4GL call your programming language of choice? Even better, can your programming language call your 4GL?

Many 4GLs incorporate heavy-duty analytical powers. You may want to check out whether your product handles cluster analysis, graphics charting, time-series analysis, linear programming or regression analysis.

Initially, most 4GLs were purely mainframe-based. Gradually, many of the vendors have ported their products to the PC and, in some cases, to minicomputers.

Here, the first thing you want to know is how data is transferred from the mainframe to a PC or minicomputer. Does the product handle this process or does it require the installation of additional software?

You might also ask: Can I write a 4GL request on the PC and have it sent up to the mainframe to be executed, then have the mainframe send back the results? This is known as concurrent processing; some 4GLs support it, while some others do not.

More questions

If we push this concept one step further, we wind up in the realm of distributed processing. If your company runs a multi-platform shop, you might want to raise some pertinent questions about the vendor's ideas on this 4GL architecture of the future. Is it planning versions of the language for additional platforms, such as Digital Equipment Corp. machines? What about Unix? When?

Finally, don't forget some more obvious questions in the area of pricing and vendor support. Prices and pricing structures vary widely. Is the price based on the number of CPUs to be employed? Does the vendor charge a flat fee if the language is run on a network?

There are also a number of things you want to know concerning support. Does the vendor offer training? If so, are there regular sessions? How often? For how many people? Does the vendor provide an 800 number? What kind of documentation does the vendor provide? Are there books about the language available?

As you can see, there's a whole slew of questions that you must keep in mind if you intend to select the right 4GL for your company. It's certainly not an easy choice.

Keyes is president of New Art, Inc., a management and computer consulting firm in New York, and a former managing director of technology at the New York Stock Exchange.

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The BoCoEx index on used computers

Closing prices report for the week ending Feb. 9, 1990

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XT Model 086	$700	$825	$700
XT Model 089	$875	$900	$700
AT Model 099	$1,250	$1,600	$1,200
AT Model 239	$1,825	$1,850	$1,700
AT Model 339	$1,975	$1,975	$1,700
PS/2 Model 50	$1,800	$1,900	$1,500
PS/2 Model 60	$2,425	$2,700	$2,425
Compaq Portable II	$1,700	$1,725	$1,550
Portable III	$2,400	$2,500	$2,000
Portable 286	$1,900	$2,000	$1,600
Plus	$750	$950	$675
Deskpro	$900	$1,200	$800
Deskpro 286	$1,525	$2,025	$1,300
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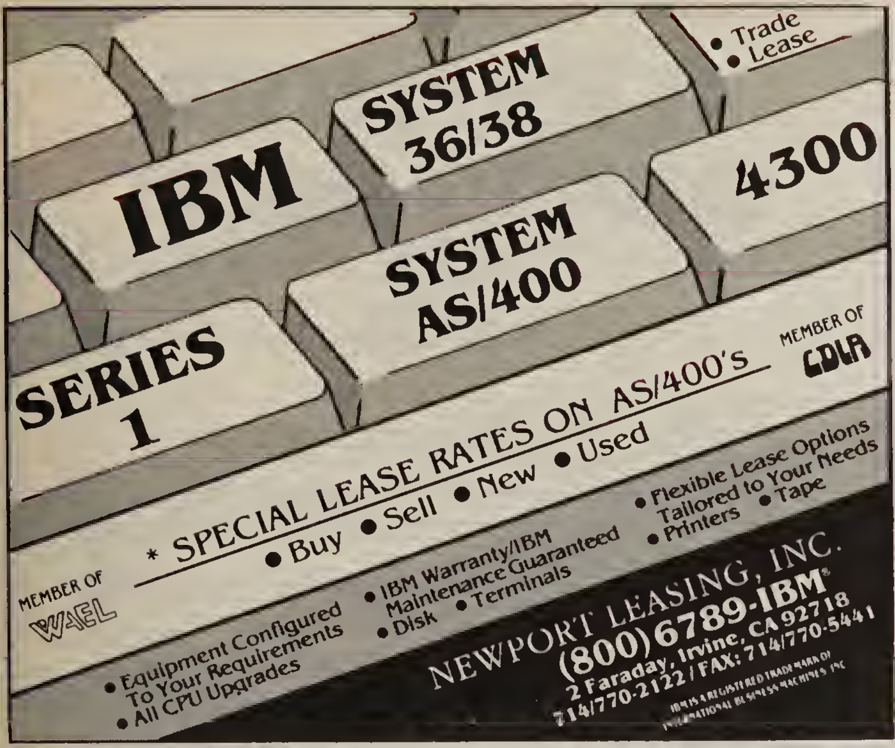
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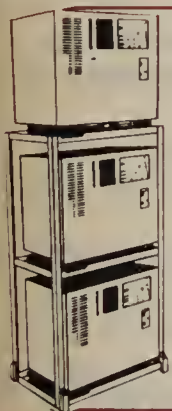

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JOHN P. OAKES, JR., et al.,
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OKI ELECTRIC INDUSTRY CO., LTD.,
OKI AMERICA, INC., and
RICOH CORPORATION,
Defendants

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The Housing Authority (NYCHA) of the City of New York, is seeking proposals from consulting firms for work required in connection with the development, design and implementation for updating and enhancing the present Energy Management Information System in the Housing Authority. Copies of the Request for Proposals may be obtained from Mr. William Steinmann at the Housing Authority at 250 Broadway, Room 711, New York, New York 10007 or by phoning Mr. Steinmann at (212) 306-3702 or by Fax # (212) 306-6481.

A Proposers Conference will be held at NYCHA at 10:00 A.M. on March 6, 1990. The deadline for receipt of proposals is 10:00 A.M. on March 28, 1990. Further details will be found within the Request for Proposals.

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BY WILLIAM SEB
SPECIAL TO CW

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Networking as a learning tool

To optimize a learning experience, students should interact frequently

BY WILLIAM SEBRELL
SPECIAL TO CW

One dictionary definition of a network is “an organization of distributed but related entities under common control.” Another one is “multiple circuit elements in a single package.” Although it’s a somewhat facetious notion, both of these definitions can describe students participating in a training program together.

However, while the students may be part of a network, they don’t always interact with the other components. To get the most from the educational experience, they must communicate with each other. They also should communicate with the instructor. To really maximize the experience, they should network before and after the class, at lunch and during breaks — whenever they have a chance.

Why is it so important to be more than a bump on a log in the classroom? The answer lies in modern concepts of how adults learn. Academic institutions tend to use a classical pedagogical model that emphasizes teaching. Commercial technical training, on the other hand, with its audience of adult professionals already into their careers, needs to use another model — one that emphasizes learning.

This learning model incorporates several elements. One is the physical surroundings: You can’t seat adults at little desks with inkwells. They need an environment more like an office, with comfortable chairs that swivel and tilt.

The learning model also calls for a different educational planning process. Students in school face a rigid curriculum, or at least some required courses. Adults pursuing professional education usually take subjects in a sequence that they have determined themselves.

Self-evaluation is another element of the adult learning model that represents a departure from the pedagogical approach.

Finally, one of the most important ingredients is extensive use of experiential techniques in the classroom. In addressing this need, effective technical instructors use hands-on workshops extensively and tap into the experiences of students.

Students must network with each other to benefit from these experiential techniques. If this kind of communcation is lacking, the basic premise that students learn from each other rapidly falls apart. The educational effort will fall back on experiences related by the instructor. The system reverts to the pedagogical model, and the education is not nearly as effective. The students tend to feel that they haven’t put much into the class; hence, they feel they haven’t gotten much out of it, and they’re probably right.

The inability to share personal experiences and the lack of personal networking are among the reasons technical people have been opposed to training media such as videotape- and computer-based instruction.

Personal workstations and electronic mail open the door to enhancing these media with the addition of networking capabilities. People who are taking a media course at the same time can log onto an electronic bulletin board, for example. Through it, they can ask questions, offer answers and share experiences much as they can do in a classroom. An “instructor” can monitor the bulletin board, keeping questions and answers on track and possibly opening up dialogue among the students.

This electronic networking requires considerable time and effort to manage and schedule properly. It doesn’t replace the networking possible in a classroom, but it certainly can improve the effectiveness of media training. Students do not feel they’ve been left to learn alone, and the machine-based learning environment takes on more of the human element.

> TO GET THE most from the educational experience, students must communicate with each other.

One organization with which I’m familiar developed a clever and much less elaborate device for encouraging student networking. It is a card folded like a tent that the students place in front of them during the class. On the front, as usual, the students write their name. On the back, facing them, is a reminder to smile along with 10 tips on getting the most out of the program:

- This training program belongs to you and its success rests largely with you.
- Enter into the discussions enthusiastically!
- Give freely of your experience.
- Ask questions if something isn’t clear.
- Say what you think.
- Set goals for using what you learn.
- Listen carefully to the discussion.
- Discuss the program with your boss.
- Appreciate the other person’s point of view.
- Apply the course material on the job.

Sebrell is a vice-president at Data Base Management, Inc., a subsidiary of American Management Systems, Inc. in Manchester, Conn.

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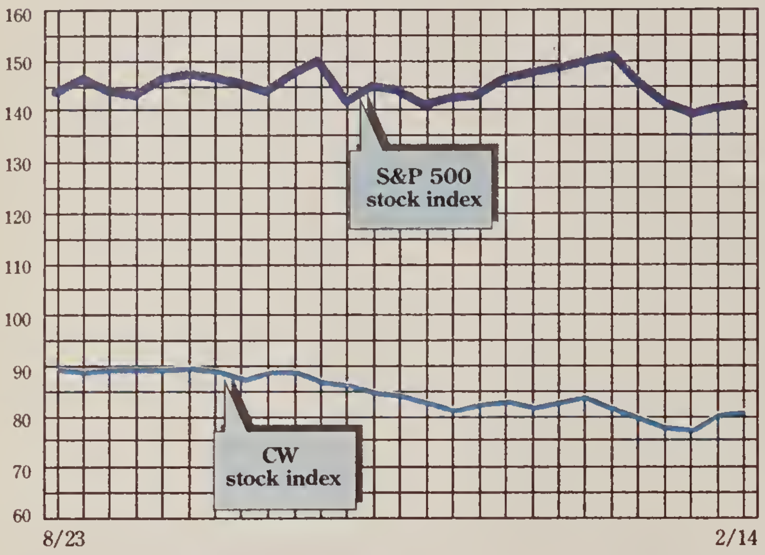

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Computer Systems	78.7	**77.7**
Software & DP Services	114.9	**115.2**
Semiconductors	50.7	**51.1**
Peripherals & Subsystems	74.7	**73.9**
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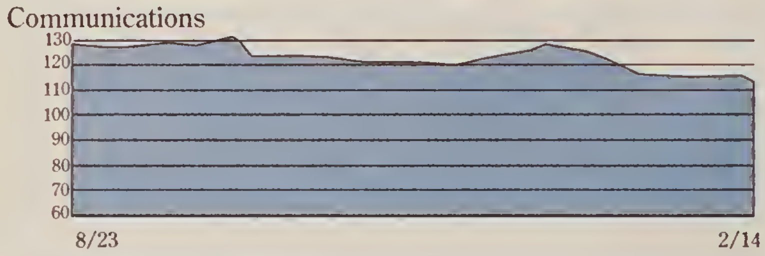

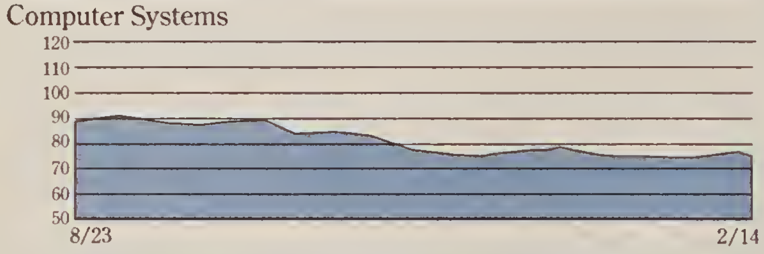

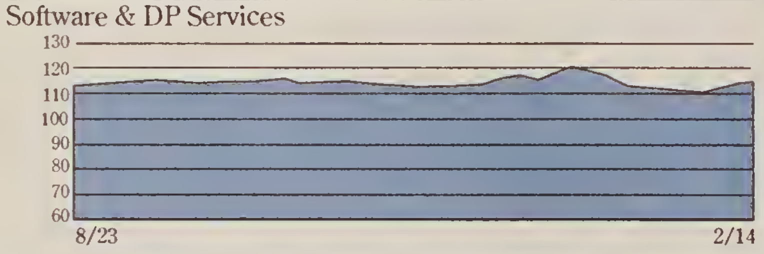

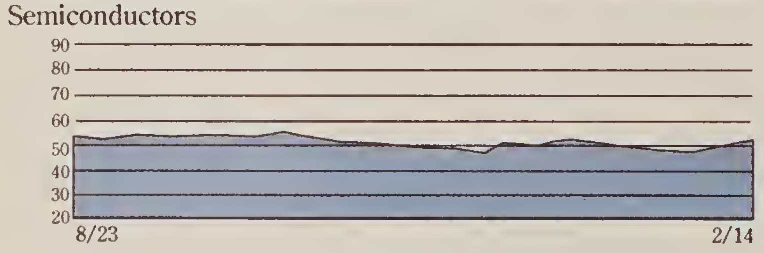

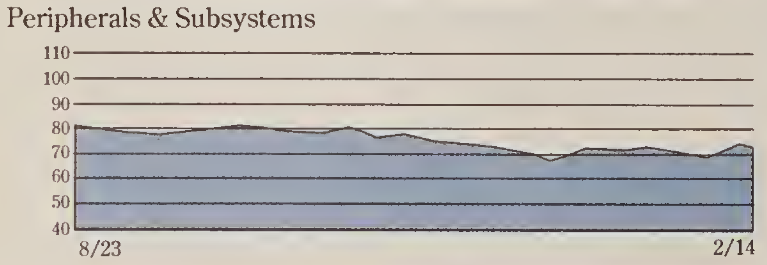

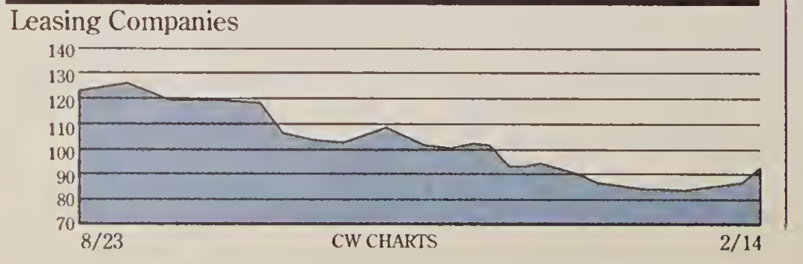

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, FEB. 14, 1990

Communications and Network Services

EXCH		52-WEEK RANGE		PRICE CLOSE FEB. 14 1990	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN INFO TECHS CORP	68	50	57.25	-0.4	-0.7
Q	ANDREW CORP	26	18	23.75	0.5	2.2
Q	ARTEL COMM CORP	9	2	7.75	0.1	1.6
N	AT&T	47	30	40	0.1	0.3
Q	AVANTEK INC	7	2	2.5	0.0	0.0
N	AYDIN CORP	21	14	14.75	-0.3	-1.7
N	BELL ATLANTIC CORP	114	72	91.75	-1.0	-1.1
N	BELLSOUTH CORP	59	40	53.125	0.3	0.5
Q	COMPRESSION LABS INC	13	4	11.5	-0.6	-5.2
Q	CONTEL CORP	37	23	27.125	-1.3	-4.4
Q	DATA SWITCH CORP	6	2	2.25	-0.6	-21.7
Q	DIGITAL COMM ASSOC	25	17	20.125	-0.9	-4.2
Q	DYNATECH CORP	21	16	16	-1.0	-5.9
Q	FIBRONICS INTNL INC	7	4	5.875	0.1	2.2
Q	GANDALF TECHNOLOGIES	7	3	3.375	0.1	1.9
N	GENERAL DATACOMM INDS	7	4	4.375	-0.1	-2.8
N	GTE CORP	72	44	61.5	-1.6	-2.6
Q	INFOTRON SYS CORP	13	6	6.75	-0.3	-3.6
N	ITT CORP	65	51	52.875	-0.1	-0.2
N	M A COM INC	9	4	4.5	0.4	9.1
Q	MCI COMMUNICATIONS CORP	49	24	31.125	-1.4	-4.2
N	NETWORK EQUIP TECH INC	32	19	29.625	1.6	5.8
Q	NETWORK SYS CORP	10	7	9.25	0.4	4.2
N	NORTHERN TELECOM LTD	25	14	23.5	-0.4	-1.6
Q	NOVELL INC	38	24	35.25	1.3	3.7
N	NYNEX CORP	92	67	79	-0.8	-0.9
N	PACIFIC TELESIS GROUP	52	33	44.75	-1.1	-2.5
A	PENRIL CORP	9	4	6.75	0.5	8.0
N	SCIENTIFIC ATLANTA INC	25	14	23.75	-0.5	-2.1
N	SOUTHWESTERN BELL CORP	65	42	53.25	-0.8	-1.4
Q	3 COM CORP	29	10	11.375	0.3	2.2
N	U S WEST INC	81	59	69.5	-0.4	-0.5

Computer Systems

EXCH		52-WEEK RANGE		PRICE CLOSE FEB. 14 1990	WEEK NET CHNGE	WEEK PCT CHNGE
Q	ALLIANT COMPUTER SYS	8	3	7.875	1.3	18.9
Q	ALPHA MICROSYSTEMS	8	4	3.875	0.0	0.0
Q	ALTOS COMPUTER SYS	8	5	5.25	-0.3	-4.5
A	AMDAHL CORP	23	11	14.625	-0.9	-5.6
Q	APPLE COMPUTER INC	50	32	34.25	1.0	3.0
N	BOLT BERANEK & NEWMAN	10	5	5.5	0.4	7.3
N	COMPAQ COMPUTER CORP	113	65	87.75	1.6	1.9
N	COMMODORE INTNL	20	7	8.375	0.0	0.0
Q	COMPUTER AUTOMATION INC	6	2	3.313	-0.7	-17.2
N	CONTROL DATA CORP	24	16	16.75	-1.0	-5.6
N	CRAY RESH INC	61	31	46.25	-0.3	-0.5
Q	DAISY SYS CORP	6	0	0.625	0.0	0.0
N	DATA GEN CORP	20	9	9.875	0.1	1.3
N	DATAPOINT CORP	6	3	3.125	-0.6	-16.7
Q	DELL COMPUTER CORP	9	5	6.125	-1.1	-15.5
N	DIGITAL EQUIP CORP	116	75	77.75	-1.4	-1.7
N	FLOATING POINT SYS INC	4	1	1.625	0.1	8.3
N	HARRIS CORP	40	27	31.5	1.4	4.6
N	HEWLETT PACKARD CO	60	40	46.75	-0.9	-1.8
N	HONEYWELL INC	92	62	78.75	-3.8	-4.5
N	IBM	127	93	103.75	0.6	0.6
Q	INFORMATION INTL INC	16	12	12.25	0.3	2.1
Q	IPL SYS INC	9	5	6.875	0.1	1.9
N	MAI BASIC FOUR INC	11	2	3	0.0	0.0
N	MATSUSHITA ELEC INDL LTD	186	152	154	-1.0	-0.6
Q	MENTOR GRAPHICS CORP	22	14	15.25	-0.8	-4.7
N	NBI INC	3	0	0.375	0.1	19.8
N	NCR CORP	71	53	67.875	-1.1	-1.6
Q	PYRAMID TECHNOLOGY	25	9	23.125	-1.1	-4.6
Q	SEQUENT COMP SYS INC	23	10	21.25	-0.9	-4.0
Q	SHAREBASE CORP	3	0	0.438	-0.1	-22.2
Q	SUN MICROSYSTEM INC	23	13	22	0.3	1.1
Q	SYMBOLICS INC	3	1	0.813	-0.1	-7.1
N	TANDEM COMPUTERS INC	29	15	28.5	0.8	2.7
N	TANDY CORP	49	32	32.5	-1.6	-4.8
N	ULTIMATE CORP	12	7	7.5	-0.5	-6.3
N	UNISYS CORP	30	12	14.375	0.1	0.9
A	WANG LABS INC	10	4	4.125	0.0	0.0

Software & DP Services

EXCH		52-WEEK RANGE		PRICE CLOSE FEB. 14 1990	WEEK NET CHNGE	WEEK PCT CHNGE
Q	AMERICAN MGMT SYS INC	18	11	12	-0.3	-2.0
Q	AMERICAN SOFTWARE INC	23	11	19	-2.0	-9.5
N	ANACOMP INC	8	3	3.5	-1.0	-22.2
Q	ANALYSTS INTL CORP	20	11	16.25	-0.3	-1.5
Q	ASHTON TATE	24	9	11	-0.9	-7.4
Q	ASK COMPUTER SYS INC	17	7	8.75	-0.9	-9.1
N	AUTO DATA PROCESSING	51	36	48.875	-1.0	-2.0
Q	AUTODESK INC	46	27	44.25	1.5	3.5
Q	BMC SOFTWARE INC	33	15	30.25	0.6	2.1
N	BUSINESSLAND INC	15	7	7.25	0.0	0.0
Q	COGNOS INC	8	4	4.438	0.1	1.4
N	COMPUTER ASSOC INTL INC	22	11	13.125	0.3	1.9
Q	COMPUTER HORIZONS CORP	11	7	8.5	0.0	0.0
N	COMPUTER SCIENCES CORP	59	47	49.375	0.3	0.5
N	COMPUTER TASK GROUP INC	16	9	9.5	0.0	0.0
Q	COMSHARE INC	42	24	38	1.5	4.1
Q	CORPORATE SOFTWARE	16	8	9	-0.3	-2.7
N	GENERAL MTRS (CLS E)	58	43	52.125	0.0	0.0
Q	HOGAN SYS INC	7	4	4	0.1	3.2
Q	INFORMIX CORP	17	8	15.5	-0.3	-1.6
Q	INTELLICORP INC	6	3	5	0.7	15.9
Q	LEGENT CORP	32	21	27	-0.6	-2.3
Q	LOTUS DEV CORP	34	19	30.125	0.4	1.3
Q	MICROSOFT CORP	96	46	95	1.8	1.9
Q	NATIONAL DATA CORP	35	24	30.25	1.5	5.2
N	ON LINE SOFTWARE INTL INC	11	5	9.625	-0.3	-2.5
Q	ORACLE SYS CORP	26	11	23.625	2.3	10.5
N	PANSOPHIC SYS INC	19	12	15.375	-0.6	-3.9
Q	PHOENIX TECHNOLOGIES INC	18	3	3.563	0.3	9.6
Q	POLICY MGMT SYS CORP	38	22	33.75	-0.9	-2.5
Q	PROGRAMMING & SYS INC	22	16	17.5	0.0	0.0
Q	RELATIONAL TECH INC	16	5	8	0.5	6.7
N	REYNOLDS & REYNOLDS CO	34	19	20.5	0.5	2.5
Q	SAGE SOFTWARE INC	11	7	9.75	0.4	4.0
Q	SEI CORP	20	15	15.5	0.8	5.1
Q	SHARED MED SYS CORP	19	12	12.75	-0.1	-1.0
Q	SOFTWARE PUBG CORP	21	10	18.25	2.0	12.3
A	STERLING SOFTWARE INC	9	5	8.875	0.0	0.0
Q	SUNGARD DATA SYS INC	26	13	21	-1.8	-7.7
Q	SYSTEMATICS INC	40	30	30	-0.5	-1.6
N	SYSTEM CENTER INC	26	18	23.75	0.0	0.0
N	SYS. SOFT INC	25	12	23.125	0.1	0.5
Q	WORDSTAR	3	1	0.875	0.0	0.0

Semiconductors

EXCH		52-WEEK RANGE		PRICE CLOSE FEB. 14 1990	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADV MICRO DEVICES INC	11	7	7.125	-0.3	-3.4
N	ANALOG DEVICES INC	12	7	7.5	0.1	1.7
Q	ANALOGIC CORP	11	8	9.875	0.0	0.0
Q	CHIPS & TECHNOLOGIES INC	26	14	19.625	1.4	7.5
Q	INTEL CORP	42	23	40	-0.3	-0.6
Q	MICRON TECHNOLOGY INC	26	7	9.625	0.6	6.9
N	MOTOROLA INC	64	40	59.125	0.5	0.9
N	NATL SEMICONDUCTOR	9	5	6.125	0.0	0.0
N	TEXAS INSTRS INC	47	28	33.375	-1.1	-3.3
A	WESTERN DIGITAL CORP	15	6	9.375	-0.3	-2.6

Peripherals

EXCH		52-WEEK RANGE		PRICE CLOSE FEB. 14 1990	WEEK NET CHNGE	WEEK PCT CHNGE
Q	ALLOY COMP	3	1	1.75	0.0	0.0
N	AM INTL INC	6	3	3.625	-0.3	-6.5
Q	AST RESH INC	15	7	14.5	-0.4	-2.5
Q	AUTO TROL TECH CORP	6	3	3.25	-0.1	-1.9
Q	BANCTEC INC	20	11	17.625	-0.4	-2.1
Q	CIPHER DATA PRODS INC	11	4	7.5	0.5	7.1
A	COGNITRONICS CORP	8	3	4.875	-0.4	-7.1
Q	CONNOR PERIPHERALS	16	7	15.625	0.5	3.3
A	DATAPRODUCTS CORP	18	6	5.875	-0.1	-2.1
A	DATARAM CORP	13	8	12.5	1.4	12.4
N	EASTMAN KODAK CO	52	37	38.75	0.4	1.0
N	E M C CORP MASS	6	3	4.25	0.0	0.0
Q	EMULEX CORP	12	5	5.25	0.0	0.0
Q	EVANS & SUTHERLAND	26	16	24.75	0.0	0.0
Q	ICOT CORP	3	1	1.375	-0.1	-8.3
Q	INTERLEAF INC	10	5	5.75	-0.3	-4.2
Q	IOMEGA CORP	4	2	3.313	-0.2	-5.3
Q	LEE DATA CORP	4	1	1.5	-0.3	-14.3
Q	MASSTOR SYS CORP	4	2	1.938	0.0	0.0
Q	MAXTOR CORP	12	7	10.75	-0.3	-2.3
Q	MICROPOLIS CORP	8	3	5	0.5	11.1
N	MINNESOTA MNG & MFG CO	84	65	80.125	-0.8	-0.9
Q	PERSONAL COMP PRODUCTS INC	6	4	3.875	0.1	1.6
Q	PRINTRONIX INC	11	7	11	1.3	12.8
N	QMS INC	15	7	14.25	0.8	5.6
Q	QUANTUM CORP	17	5	10.375	-0.9	-7.8
N	RECOGNITION EQUIP INC	13	6	6.25	-0.1	-2.0
Q	REXON INC	8	6	6.875	0.0	0.0
Q	SEAGATE TECHNOLOGY	20	9	18.25	-0.8	-3.9
N	STORAGE TECH CORP	23	9	16.75	-0.5	-2.9
Q	TANDON CORP	1	0	0.813	0.0	0.0
N	TEKTRONIX INC	24	16	16.375	-0.3	-1.5
Q	TELEVIDEO SYS INC	1	0	0.219	0.0	-12.4
N	XEROX CORP	69	51	51.75	-3.8	-6.8

Leasing Companies

EXCH		52-WEEK RANGE		PRICE CLOSE FEB. 14 1990	WEEK NET CHNGE	WEEK PCT CHNGE
Q	AMPLICON INC	115	8	8.375	0.1	1.5
N	CAPITAL ASSOC INTNL INC	9	3	3.5	-0.3	-6.7
N	COMDISCO INC	34	21	23.5	-0.3	-1.1
Q	CONTINENTAL INFO SYS	2	0	0.344	0.1	47.0
Q	LDI CORPORATION	18	13	14.25	-0.5	-3.4
Q	PHOENIX AMERN INC	5	3	3.25	0.1	4.0
Q	SELECTERM INC	9	6	6	0.0	0.0

EXCH: N = NEW YORK; A = AMERICAN; Q = NATIONAL

A winter sail

Tide remains calm on Street while Drexel sinks in red sea

As junk-bond giant Drexel Burnham Lambert, Inc. struggled to tread water last week, the rest of Wall Street seemed to feel nary a ripple. In fact, most technology stocks sailed smoothly upward: Witness Compaq Computer Corp., which closed Thursday at 88¾, jumping 2¾ points.

Like its new line of workstations unveiled Thursday (see story page 1), IBM stocks were up and running last week, closing at 103¾ points, up 1¼.

Meanwhile, Sun Microsystems, Inc. appeared unfazed by IBM's move into the workstation market; its stock rose one point to 22⅝.

Digital Equipment Corp., however, lost traction midweek, sliding 3½ points by Thursday to finish the day at 76½.

Among the other gainers was Microsoft Corp., which picked up 2½ points to finish at 97 on Thursday. Novell, Inc. and Oracle Systems Corp. each rose 1⅜ points to 36⅛ and 23⅞, respectively.

In other industry action, both Texas Instruments, Inc. and Informix Corp. were down. TI dropped 1⅝ to 33, while Informix lost 1½ points, ending the week at 14⅜.

KIM S. NASH

IBM RISC entry clouds Sun's future

Big Blue boxes undermine workstation leader with price/performance

BY PATRICIA KEEFE
CW STAFF

The competitor most directly in the line of fire from IBM's RISC System/6000 family coincidently happens to be the technical workstation market leader, Sun Microsystems, Inc.

The timing of IBM's entry into the reduced instruction set computing (RISC) market is less than ideal for Sun. At a time when Sun is struggling to rebound from financial problems, its workstation strategy is expected to come under great pressure from IBM's price/performance.

Cheryl Vedoe, director of marketing for the general systems division at Sun, promised that Sun has "a strong answer to the Powerstation in terms of systems advantages. IBM still has a fair way to go because it is starting from ground zero."

IBM and Sun customer Jim Stoddard, senior vice-president at Fidelity Software Development Co., a unit of Fidelity Investments, agreed.

IBM has to provide "more than just pure price/performance to do what we are already doing with Sun workstations," said Stoddard, whose company uses IBM's Application System/400 but has also installed about 100 Sun workstations for traders.

Nevertheless, IBM expects to land a direct hit against Sun's spotty service and support record. Bill Filip, IBM's assistant general manager of Personal Systems, noted IBM will offer Powerstation customers a one-year guarantee and seven-day-a-week service and support. Sun only provides a 90-day warranty on its workstations, he said.

However, it is not just Sun that needs to worry. Digital Equipment Corp.'s previous RISC efforts were generally panned (see story page 1). Don Gaubatz, manager of DEC's workstation division, conceded that the new IBM line has pushed past the competition in terms of sheer performance and CPU speed, but he criticized the RS/6000's "limited" low-end graphics capabilities.

Even so, IBM's RS/6000 family is such a dramatic improvement over its earlier Unix-based line, the RT, that other competitors rushed to position themselves as specialists and IBM as a latecomer generalist.

"The best thing for us to do in our marketing is to point out that Unix is a secondary strategy for IBM, second to SAA," said Eric Carlson, vice-president and general manager at Unysis Corp.'s Network Computing Group's Unix System's Group (NCG).

Others took a more respectful tone. "It's great because it . . . made Unix more credible and less of a sticking point for some buyers," said John Hime, vice-president of the systems product group at Mips Computer Systems, Inc. in Sunnyvale, Calif.

"It may put more pressure on us to make sure we're competing on price/performance," said Cyril Yansouni, president of Unisys NCG's Unix System Group in San Jose, Calif. "We don't want to be naive about the impact IBM will have on the Unix marketplace."

Resource server

IBM's RS/6000 RISC line includes five Powerserver configurations for use as a multiuser time-sharing host or LAN resource

Model	Memory	Internal storage	Base price	MIPS
320	16M bytes to 32M bytes	320M bytes to 640M bytes	$20,375	27.5
520	16M bytes to 128M bytes	355M bytes to 2.5G bytes	$30,425	27.5
530	16M bytes to 128M bytes	355M bytes to 2.5G bytes	$41,125	34.5
540	64M bytes to 256M bytes	640M bytes to 2.5G bytes	$92,885	41
930 (rack mounted)	16M bytes to 128M bytes	670M bytes to 12G bytes	$62,230	34.5

Source: IBM

CW Chart: John York

A shot in the foot?

An eager IBM runs the risk of unleashing "friendly fire" on two key Systems Application Architecture platforms — the AS/400 and the OS/2-based PS/2.

Any cannibalization of proprietary systems is not expected to become an issue for more than a year. When it does, analysts suggest that the AS/400 may find its entry into some vertical markets barred by developers who opted to port to AIX. This is sufficient cause for concern, given that Framingham, Mass.-based market research firm International Data Corp. projects a 1% drop in AS/400 market share between 1989 and 1994.

PS/2 desktop sales could well feel the sting of low-end Powerstations. AIX already runs on the PS/2, and Version 3 can support DOS 3.3 applications.

"I have an $8,000 386-based PC on my desk that runs at 3 MIPS. It's incredible to me that for the same price, I can get a 6-MFLOP, 27.5-MIPS box with 8M bytes of memory, a 128M-byte drive and a monochrome display with 16 shades of gray," said Clifford Friedman, a vice-president at Bear Stearns & Co. in New York.

Microsoft Corp. declined comment on the RS/6000.

PATRICIA KEEFE

Proprietary

FROM PAGE 1

software packages.

Yet while DEC has played up its Unix product line for technical users, many commercial customers are finding the price/performance differential too compelling to ignore, several analysts agreed.

Now with IBM aggressively crashing the workstation party with its nine new powerstations and servers, DEC has yet another barrage to dodge.

Are they worried? Not hardly, said Don Gaubatz, manager of the workstation division at DEC. "I would say IBM is validating all our interest in the Unix marketplace," Gaubatz said.

IBM may have leapfrogged the competition on superscalar chip technology, sheer millions of instructions per second and floating-point performance, he added, but its graphics options were "conspicuous by their total absence on the desktop."

The manager said DEC's second-generation RISC machines, due out within a month or so, would include "very agressive" two- and three-dimensional graphics features, faster buses and a desktop line generally "more balanced" than IBM's.

But criticism of IBM's graphics has a hollow ring coming from DEC, industry analysts said.

"DEC has the raw CPU performance, but its workstation graphics were terrible," said Robert Herwick, an industry analyst at the New York office of Hambrecht & Quist, Inc.

With IBM barging into the commercial arena with RISC machines, the computer giant is trodding on what analysts say is DEC's Achilles' heel.

"What we are hearing from user clients is that DEC is generally not promoting those systems in commercial applications," said Peter Schay, an analyst at Gartner Group, Inc. in Stamford, Conn. "We've had reports from users who asked for RISC system quotes for commercial systems and had the salespeople come back with VAX/VMS quotes."

DEC President Kenneth H. Olsen, a longtime Unix-basher, has keyed DEC's corporate strategy into selling the RISC/Ultrix boxes to scientific and technical users already screaming for Unix. The message to the sales force was clear: Keep the commercial customers in proprietary VAX/VMS.

"A lot of salespeople were not excited about breaking the VAX/VMS hold on their accounts," Herwick said. He estimated that DEC probably sold as many as 40,000 Ultrix workstations and servers in the past year, compared with the 100,000 sold by Sun Microsystems, Inc.

At Princeton University's computer science department, the performance of three new DEC RISC systems has proved to be "a little disappointing," said Pat Parseghi, director of computer systems.

"They don't get quite the same performance out of the Mips chip as Silicon Graphics and Mips' own processors do," Parseghi said. The Q buses on the Decstation 3100 and Decsystem 5400 were much slower than expected, she added, and the Decsystem 5800 delivery was three months behind schedule.

While DEC would still prefer to corral its commercial users into the VAX/VMS environment, the company admits it is trying to catch up to demand for Unix applications from business users. Within the past year, DEC has revitalized its relationships with value-added resellers and independent software vendors, which had fallen into disrepair. So far, at least 70 Unix resellers have struck agreements with DEC to port their software to the Ultrix platform.

Underdone Ultrix

At the heart of Digital Equipment Corp.'s foray into the Unix workstation market is Ultrix — its own flavor of AT&T's Unix operating system.

But analysts, customers and even DEC resellers say that Ultrix is a half-baked Unix, underdone when it comes to the kind of robust features users are demanding.

DEC's "Ultrix strategy is Orwellian," said Peter Schay, an analyst at Gartner Group, Inc. "They claim VMS and Ultrix are equal, but VMS is more equal than Ultrix."

Robert Herwick, an analyst at the New York office of Hambrecht & Quist, Inc., said DEC's rush to get its reduced instruction set computing systems on the market made it neglect the task of lining up enough software vendors to port their applications to Ultrix. "That's what did in [IBM's] RT, but DEC hadn't noticed that," Herwick said.

A few customers, however, did notice. At the Phoenixville Medical Association in Phoenixville, Pa., finance director Scott Bowes spent the last 18 months wrestling with his own Ultrix nightmare.

The association, which handles patient accounting and billing for 10 physicians' offices, was among the first customers to try the Decsystem 5400, a $75,000 RISC-based number-cruncher. It was not a happy experience.

The organization first jettisoned its old Data General Corp. machine in favor of a Microvax II running Ultrix. Bowes ran into so much trouble with crashing tape drives and controllers that he wrote to DEC President Ken Olsen in protest. "It took more than a year to get DEC to admit the hardware was not compatible with Ultrix," Bowes said. "We agreed to swap it with a Decsystem 5400, but the performance was even worse. Page screens were taking up to 18 minutes to paint."

The medical association recently settled with a Decsystem 3100 and ironed out the last of the software glitches.

DEC officials insist that the bugs in Ultrix are being driven out, and that an active recruiting campaign among value-added resellers and independent software vendors will eventually produce hundreds of commercial applications.

MARYFRAN JOHNSON

IBM

FROM PAGE 1

blitzkrieg more than atones for its poorly received predecessor, the RT, by thoroughly covering all the bases, analysts said.

Those "bases" include four Powerstations and five Powerservers equipped with a proprietary chip set, stellar graphics, X Window System capability, AIX 3.0 and a choice of two graphical users interfaces — Next, Inc.'s Nextstep or the Open Software Foundation's OSF/Motif.

IBM also issued statements of direction concerning relational database management support and interoperability between AIX and its flagship Systems Application Architecture.

"There won't be a [workstation] installation of note that won't try one of these machines," said Sam Albert, a former IBM staffer who heads up Sam Albert Associates in Scarsdale, N.Y.

Competitors said that now IBM had legitimized the Unix and reduced instruction set computing markets, before quickly noting in the next breath that they will certainly have a trick or two up their sleeves to handle any IBM threat (see story page 139).

Despite the completeness of IBM's offering, analysts were not without reservations. While IBM chose to emphasize cutting-edge performance ranging up to 40 million instructions per second and 13 million floating-point operations per second (see related story below), analysts agreed that software, pricing and market credibility will make or break the RS/6000 and suggested that IBM should focus on the following:

- Ensure that the promised 1,500 applications are delivered by year's end, starting with the 200 slated for availability in May. Steven N. Iverson, an assistant vice-president at the First National Bank of Chicago, said that that "critical mass" will go a long way toward alleviating his worries.
- Keep price/performance competitive, particularly at the low end. Competitors, including Sun Microsystems, Inc., Digital Equipment Corp. and Hewlett-Packard Co., are all expected to answer IBM with a series of announcements during the next six months.
- Build credibility with technical managers and developers, while orienting its sales force to technical market needs.

Small chunk

IBM currently maintains less than a 2% share in an otherwise sizzling workstation market that grew 40.2% last year, totaling $6.1 billion in revenue. Dataquest, Inc., a San Jose, Calif.-based market researcher, predicted 30% annual growth during the next five years.

IBM's skimpy market share contrasts with market leader Sun's 29% slab and is directly attributable to IBM's previous effort, the RT. Considered an unmitigated failure outside of IBM, the RT lacked two things, critics said — power and software.

Richard A. Shaffer, publisher of "The Computer Letter" newsletter, said IBM cannot afford to strike out a second time: "They'd have to hang up their cleats and head for the shower."

According to Dataquest, IBM's software offerings still fall short in critical areas, such as turnkey MCAD, EDA and computer-integrated manufacturing. However, many observers expressed surprise at the breadth of applications ported to the RS/6000.

While the RS/6000 is not expected to significantly affect IBM's status as a workstation supplier during the next two years, its very presence is expected to accelerate an already bloody MIPS war.

"Look, it's a hot-box-of-the-month game," said Meta Group analyst Christian Christiansen. According to Jay Prakash, president of Strategic Focus, a workstation and computer-aided software engineering research firm, "If companies thought this wasn't a profitable business at the low end, they haven't seen anything yet."

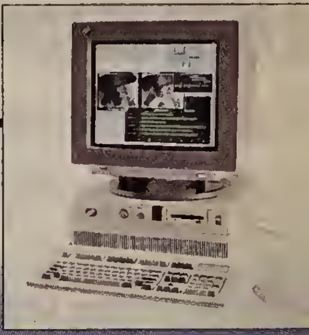
IBM is expected to further intensify the pricing fire with customer discounts ranging from 20% to 30% and a trade-in policy that nets RT users savings of either 40% or 80% off RS/6000 purchases. Just as the personal computer wars spawned clones, Young predicted that the MIPS war will lead to a wave of Unix boxes that are plug-compatible with the IBM AIX environment.

"Clearly, from a hardware perspective, everyone, including IBM, could get hurt because of lower profits," said Clifford Friedman, a vice-president at Bear Stearns & Co. in New York. "It's a double-edged sword. If you don't have [a workstation], a competitor will and you'll lose market share. On the other hand, if you do have it, you can retain market share at the cost of lower profitability."

Computerworld West Coast bureau senior correspondent James Daly and correspondents Ellis Booker and Amy Cortese contributed to this story.

RISC power play

IBM's workstation line, the RISC/6000 series of Powerstations, features four entry points



RISC System/6000▸

Model	Memory	Internal storage	Base price	MIPS
320	8M bytes to 32M bytes	120M bytes to 640M bytes	$14,945	27.5
520	8M bytes to 128M bytes	355M bytes to 2.5G bytes	$27,245	27.5
530	16M bytes to 128M bytes	355M bytes to 2.5G bytes	$42,705	34.5
730	16M bytes to 128M bytes	355M bytes to 2.5G bytes	$73,815	34.5

Source: IBM

CW Chart: John York

Odds and ends

The entry-level Powerstation 320, available in a LAN-attached version at a base price of $12,995 for 27 million instructions per second (MIPS), works out to $473 per MIPS, with a year's worth of hardware maintenance thrown in.

IBM shipped 350 RISC System/6000s to business partners and customers and 1,000 to software developers, with 100 going to customers participating in an early support program. The Federal Aviation Administration is the first RS/6000 customer, having already bought 80 of the machines as part of its project to revamp the nation's air traffic control system.

IBM Vice-President Nick Donofrio acknowledged that his firm spent money to get developers to "reprioritize resources," but he dismissed reports that IBM had spent as much as $300 million as "at least 10 times too high." IBM has established 22 "porting centers" around the world to help meet its goal of delivering 1,500 applications by the end of the year. IBM also discounted some development systems by as much as 50%.

Initial applications ported to the RS/6000 will probably run at one instruction per cycle. "None of these applications were developed with the optimizing compiler that exploits the parallel processing architecture of the system," said Nili Young, a midrange analyst at Meta Group, Inc. who left IBM's RS/6000 launch team in October. She claimed that IBM has only just shipped the optimized compiler and predicted it will be at least nine months before packages are revamped.

IBM business partner AGS Information Services, Inc. may be biting the hand that feeds it. After signing a pact with IBM authorizing it as a service provider and applications specialist for AIX, AGS said that "IBM's . . . powerful new line of RISC workstations will drive the final nail in the coffin of proprietary minicomputers." AGS Vice-President Jonathan Burley added, "We expect the marketplace reception of the RS/6000 to greatly overshadow the acceptance of IBM's AS/400 line."

Despite its slow start in the RISC workstation market, IBM invented RISC technology back in the 1970s. The RS/6000 line abandons its RT predecessor's RISC architecture for IBM RISC technology first researched in 1974 in Austin, Texas, and Yorktown Heights, N.Y., and spearheaded by John Cocke at IBM. All RISC workstations now on the market are based on this first-generation design, IBM President Jack Kuehler said.

IBM also pointed to its experience and success in the technical market, saying it has 400 3090 mainframes with vector facilities installed worldwide — an installed base greater than Cray Research, Inc. and all other vendors in the supercomputer market combined.

In a preview of future multiprocessing capability, IBM demonstrated three workstations linked together running a complex graphics application. Two optic ports are built into the RS/6000 models for future high-speed data transfer using fiber-optic cable.

A real power broker

IBM's RISC System/6000 draws much of its power from a new superscalar processor and an advanced reduced instruction set computing (RISC) double-precision 64-bit floating-point performance. Additionally, the systems feature an enhanced IBM Micro Channel Architecture, which provides I/O throughput of as much as 40M byte/sec., and high-speed small computer systems interface drives and adapters.

The superscalar processor is capable of executing up to five instructions per cycle. "They have really leapfrogged the competition in raw performance here," said Judith Hurwitz, editor of Patricia Seybold's "Unix in the Office" newsletter.

While competitors may be able to catch up to IBM's superscalar performance, they will be doing so on the third or fourth revision of their existing chips. "Who knows what power IBM's second or third 'crank' will produce?" noted Clifford Friedman at Bear Stearns.

IBM also introduced optimized three-dimensional graphics capabilities designed for complex programs such as visualization and mapping.

The RISC boxes are based on IBM's new Perfomance Optimization With Enhanced RISC (POWER) architecture and are said to provide the industry's highest desktop performance at more than 27 million instructions per second and 7 million floating-point operations per second.

The bulk of the hardware and a small percentage of the software will be delivered in May, followed up by June, July and September shipments of the remaining products.

Complete system pricing starts at $12,995 for the product line, which is broken down into workstations and servers (see chart). The workstations will interoperate with competitors' systems but do require initialization on an IBM server.

IBM also unwrapped the Xstation 120, a low-priced X Window server terminal, said to provide users with a choice of eight screens and concurrent access to a variety of applications.

PATRICIA KEEFE

IBM sparks campaign for RISC tools

BY AMY CORTESE
CW STAFF

IBM's new family of reduced instruction set computing (RISC) workstations sizzles, but a sufficient supply of software applications will be crucial to fuel the fire.

"The hardware is impressive," said Steven N. Iverson, assistant vice-president at First National Bank of Chicago, "but some key software developers are still not behind them, and that could be a problem."

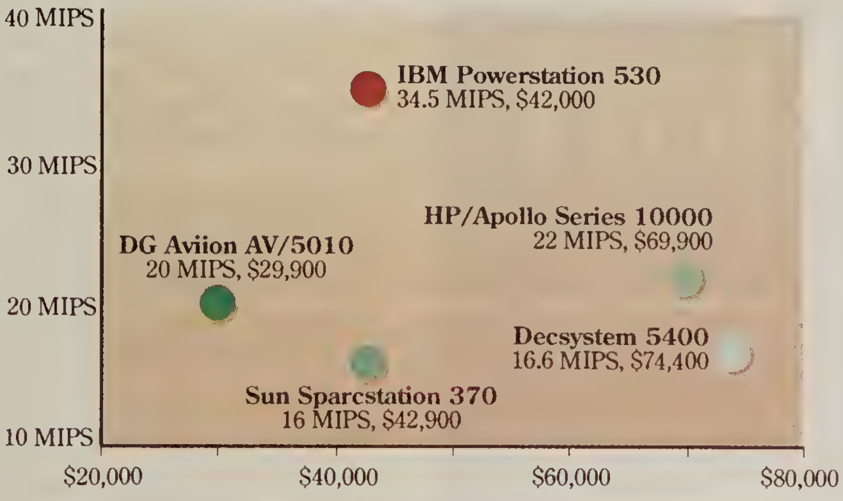
Knowing this all too well, IBM has embarked on an ambitious mission to enlist nearly 750 software developers to deliver 1,500 targeted applications. In comparison, Sun Microsystems, Inc. currently boasts somewhere in the neighborhood of 1,450 applications for its popular RISC-based workstations.

The stakes are large, as information systems departments have been drawn to the power of workstation machines once found only in engineering departments.

"Unix is an important stated direction for us, and we are just getting into it in a big way," said Ross Durham, manager in the information systems research and development division at the Bank of America. "We are currently using the Sparcstation I, but we are going to look seriously at this as an alternative."

Power horses

IBM's RISC System/6000 raises the workstation price/performance stakes



CW Chart: John York

The fruits of a massive funding and technical assistance program were readily apparent last week as more than 200 vendors were on hand in San Francisco's Masonic Temple and other locations around the country demonstrating their applications on the new machines.

To facilitate the porting process, IBM has set up 15 porting centers around the world to provide assistance and is offering 50% discounts on hardware and software to third-party software developers. IBM maintains that 200 software applications for the first RS/6000s will be available when the machine becomes generally available in May, with that number increasing to 1,500 applications worldwide by year's end. In contrast, IBM's older RT system sported a library of only a half-dozen packages at its introduction.

Reflecting IBM's emphasis on technical professionals, a list of applications published by IBM is heavy on the technical and engineering side and light on basic business applications. While a good number of names should be familiar to commercial users — such as Informix Software, Oracle Corp. and Uniplex, Inc. — the majority of applications address manufacturing, scientific and technical computing needs.

There are good reasons why IBM would position the RS/6000 as RISC systems for the technical market, not the least of which are market projections from International Data Corp., a market research firm based in Framingham, Mass., that show the market growing to $23 billion by 1992. "If IBM can sell it in the technical market, the message will carry over" to the business world, said Gary Gagliardi, president of Fourgen Software, Inc., a maker of Unix accounting software.

But there are more business applications for the RS/6000 than meets the eye. For instance, IBM is offering a personal computer simulator facility that emulates an Intel Corp. 80286-based PC that will allow hundreds of DOS applications to run on the RS/6000.

Because of powerful performance of the RS/6000, the simulator can emulate an Intel and still do it faster than many PCs, according to Harley Hahn, president of Harley Hahn Consultants in Austin, Texas, and author of a report on the RS/6000.

Similarly, Pick Blue Corp.'s Pick operating system version for AIX and database management systems — with 4,000 vertical business applications written for it — will be available on the new systems in May.

The combination of powerful workstations and the IBM name may encourage more sophisticated business applications as well. For instance, Fourgen's newest version of its accounting software lets users store images, such as pictures of employees in a payroll file, in a relational DBMS. "Such speed makes these advanced capabilities practical for commercial software," Gagliardi said.

RS/6000's AIX wins kudos, despite buggy beginnings

BY AMY CORTESE
CW STAFF

IBM's new reduced instruction set computing family would not be complete without a similarly revved up operating system, so a new version of AIX designed to exploit the enhanced RISC architecture was announced last week.

AIX Version 3 for the RISC System/6000 drew praise from developers, despite the fact that persistent bugs caused the announcement to be pushed back several months.

AIX Version 3 is based on AT&T Unix System V and the University of California at Berkeley's Unix 4.3 commands and libraries and contains enhancements to improve ease of use, performance and reliability. Highlights are logical volumes to simplify disk space management, a Systems Management Interface tool and on-line documentation and retrieval tools.

Despite significant differences from the previous version of AIX, software developers attested that the port is a piece of cake. Louise Rehling, senior vice-president of product development at SPSS, Inc. in Chicago, said the tools and compilers included made the port to AIX Version 3 the easiest the company has undertaken — no small praise considering SPSS runs on 25 different Unix platforms.

Sees stability

SPSS has been using the RS/6000 for its own internal development and plans to move its entire development effort to that platform. Rehling acknowledged that there had been problems with AIX but said that it would be "stable by the time the systems are available."

Steve Jacobs, president of Financial Automation Ltd., a Chicago-based developer of banking and real estate applications, said that if the compatibility with Unix is as good as IBM says, the choice between an AIX and a Sun Microsystems, Inc. workstation will be "a no brainer." The Powerstation/6000 is "one hell of a product," he said.

Although some degree of parallelism is built into the RS/6000 architecture, AIX does not yet support full symmetric multiprocessing (SMP). "We're interested in coupling together separate processors. We intend to get full SMP," said Nick Donofrio, president of IBM's Advanced Workstations Division. "But that's an event for next year or beyond."

Donofrio said that IBM would take advantage of the SMP capabilities expected in OSF/1, the Open Software Foundation's (OSF) upcoming version of Unix, which is based in part on AIX but gets its multiprocessing capability from Carnegie-Mellon University's Mach kernel. He reaffirmed IBM's commitment to OSF/1 but did not specify when or how it would be implemented.

Events in the Unix world that could bring the OSF and AT&T together are still unfolding. Donofrio said IBM supports the current negotiations between IBM and OSF members to open up ownership of AT&T's Unix Software Operation (USO) development arm but said those negotiations are being handled by OSF.

OSF President David Tory said that a subcommittee of OSF members was involved in the talks with AT&T. Discussions have centered on how such an organization would be structured and on placing a value on the USO. Tory said he expected the negotiations to be resolved in the next 30 to 60 days.

The tack they're taking

IBM jumped back into the RISC-based workstation market with a splash last week, and it intends to keep making waves.

Nick Donofrio, IBM vice-president and president of its Advanced Workstations Division, said work is already in progress on extending the RS/6000 line upwards and downwards, and that announcements focusing on offerings for specific industries will be forthcoming over the next few months. "We're in this for the long haul," Donofrio said. "We've only just begun."

IBM acknowledged that 1990 would be a year of ramping up, both in terms of hardware manufacturing and building a portfolio of applications. "The real measure of success is what will happen a year from now," Donofrio said. IBM's stated goal is to grab up to 20% of the fast-growing Unix market by 1992.

Donofrio listed six major statements of direction for the RS/6000 family:

- Open Systems Interconnect in addition to today's Transmission Control Protocol/Internet Protocol and LU6.2 support.
- One-point network management of Systems Application Architecture and AIX systems through Netview.
- A distributed relational database management system for both the OS/2 and AIX environments.
- File sharing using Network File System.
- E-mail between SAA's Officevision and AIX systems.
- Enhance the current C2 level of security to B1 level.

IBM said a statement of direction would not usually be announced unless the product was expected within two years.

AMY CORTESE

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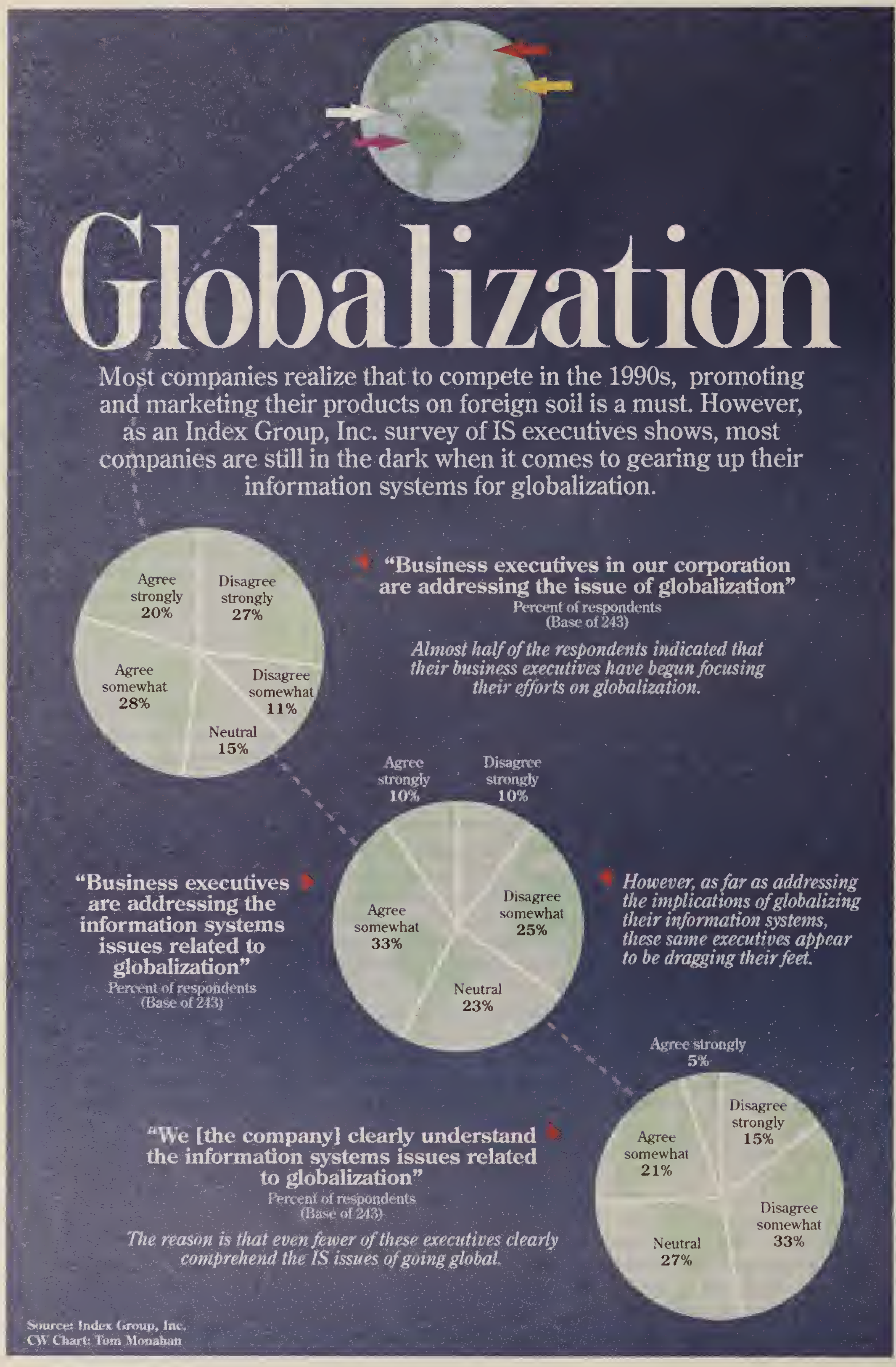

Globalization

Most companies realize that to compete in the 1990s, promoting and marketing their products on foreign soil is a must. However, as an Index Group, Inc. survey of IS executives shows, most companies are still in the dark when it comes to gearing up their information systems for globalization.

"Business executives in our corporation are addressing the issue of globalization"
Percent of respondents
(Base of 243)

Almost half of the respondents indicated that their business executives have begun focusing their efforts on globalization.

"Business executives are addressing the information systems issues related to globalization"
Percent of respondents
(Base of 243)

However, as far as addressing the implications of globalizing their information systems, these same executives appear to be dragging their feet.

"We [the company] clearly understand the information systems issues related to globalization"
Percent of respondents
(Base of 243)

The reason is that even fewer of these executives clearly comprehend the IS issues of going global.

Source: Index Group, Inc.
CW Chart: Tom Monahan

NEXT WEEK

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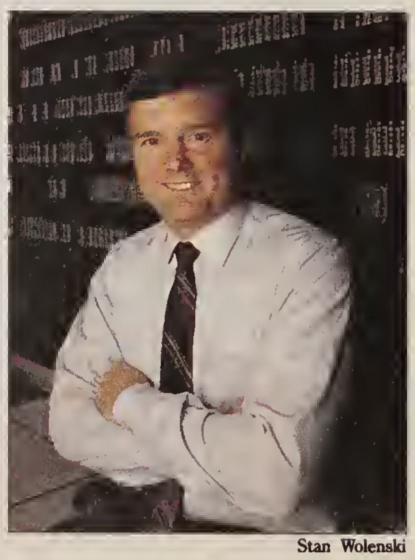

Stan Wolenski

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INSIDE LINES

Peterson to leave Merrill?

Merrill Lynch's Chief Information Officer DuWayne Peterson reportedly may be leaving the organization by next year. Sources at Merrill Lynch said Peterson's tenure was never intended to be permanent. Peterson still owns the California home where he lived while heading Security Pacific Automation Corp. until 1986.

Reach out and 'ouch' someone

According to a Bellsouth Telephone Co. security officer, the telephone company spent more than $1 million in less than one year to keep a group of hackers from illegally using its computers to defraud and send interstate wire transmissions.

Wall Street humor

Last week's Chapter 11 filing by Drexel Burnham Lambert prompted the following joke between two analysts, one of whom is a Drexel employee: Merrill Lynch is going to buy Drexel, and the new company's name will be "Lynch and Burnham."

Smart shoppers spawn sour grapes

The "free try before you buy" program that Apple offered consumers between October and January has been a complete bust, according to some computer retailers. The program gave prospective Macintosh buyers the option of rebates or taking machines home for up to three months. Now it seems that the vast majority of consumers opted to bring the Macs back, leaving dealers to wrestle with the returns. Most of the prospective customers who took the Macs home were only interested in a free rental, one dealer said.

To be, or not TV

AT&T got excited recently when the producers of the TV show *Columbo* called its techies in to explain fax machines and even Integrated Services Digital Network (ISDN), indicating that Peter Falk might use these technologies to get his man. But when the episode aired on Feb. 10, faxes played only a peripheral role (the victim was killed in the middle of sending one), while ISDN was not even mentioned. Peter Falk eventually nailed the culprit on the basis of tooth marks in a piece of cheese.

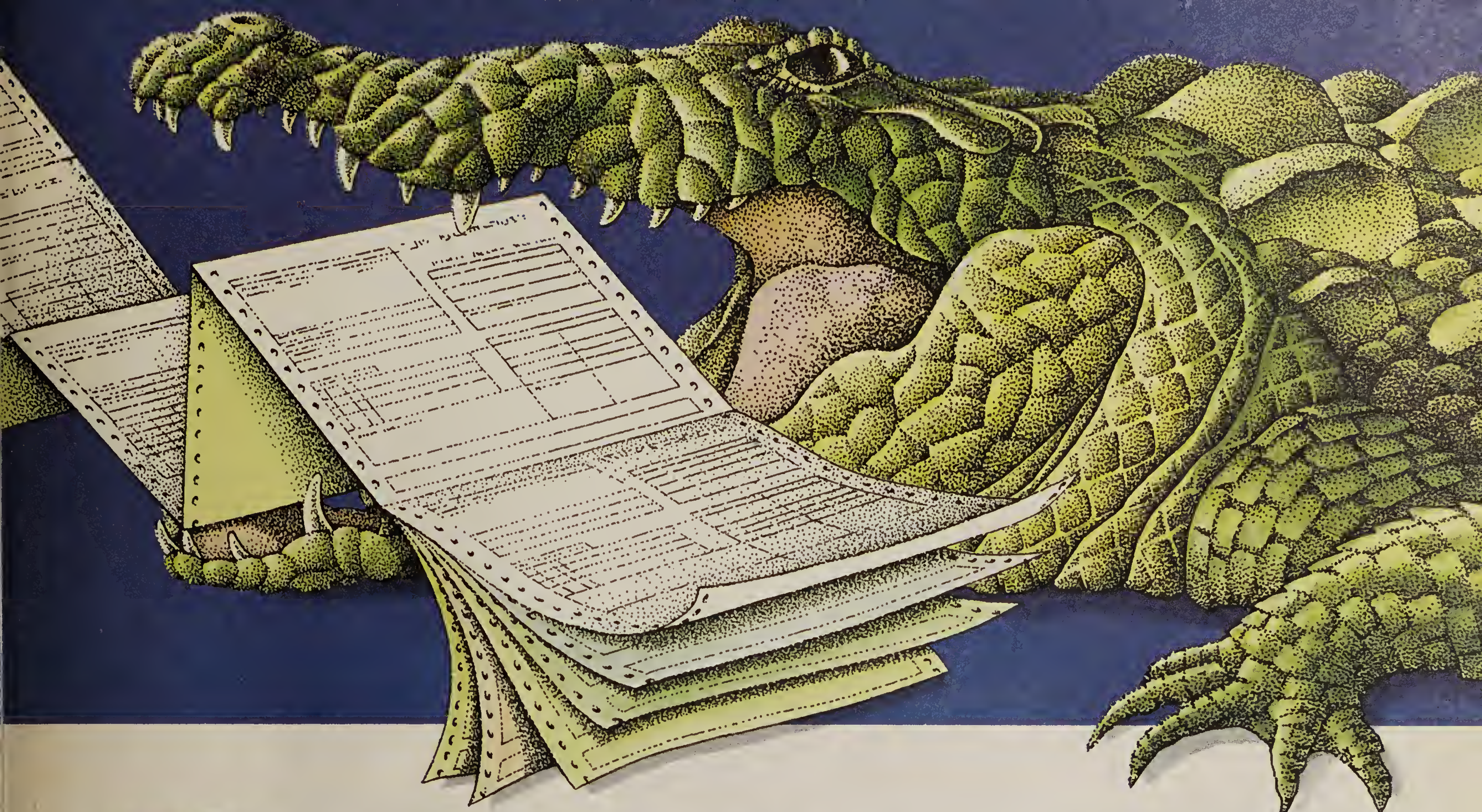
Peer review

The Association for Computing Machinery (ACM) board has been asked to issue its first-ever letter of reprimand to Robert Morris Jr., who was convicted recently under the federal Computer Fraud and Abuse Act on charges stemming from a virus he unleashed on the Internet network. Although Morris' ACM membership lapsed in March, he committed the act while an ACM member.

Baiting Big Blue?

Ryal Poppa, chairman of Storage Technology Corp., thinks his company's success in installing 1,000 automated tape libraries at Big Blue shops may lead IBM to respond with its own robotics product. "IBM will have to buy something, because they haven't developed a similar product themselves," Poppa said at the American Electronics Association show in San Jose, Calif., last week. Since 1988, IBM has been investigating robotic tape-cartridge systems from the German companies Grau A.G. and C. Haushahn GmbH. Poppa believes that IBM is looking at yet another system from Comparex Informationsyteme GmbH in Mannheim, a distributor of IBM-compatible systems that is jointly owned by BASF and Siemens A.G.

We apparently jumped the gun a couple of weeks ago when we said here that Apple's upcoming Macintosh IIXI would probably use Motorola's 68040. Despite being announced early last year in an attempt to steal some thunder from Intel's I486, Motorola doesn't expect systems using the 68040 to appear any time soon, and the last thing Apple needs right now is a system it can't deliver. If you catch us in a mistake, pass along the barbs to News Editor Pete Bartolik via MCI-Mail (address: COMPUTERWORLD*), fax (508-875-8931) or phone (800-343-6474).*



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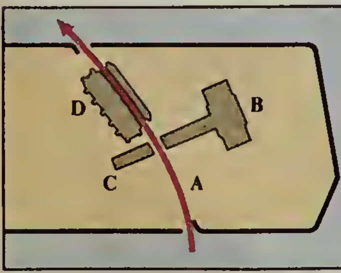

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